



Skills for Employment Investment Program (SEIP)

**COMPETENCY-BASED LEARNING
MATERIAL**

(STUDENT GUIDE)

FOR

**BASIC TECHNIQUES OF YARN
MANUFACTURING**

(TEXTILE SECTOR)

**Finance Division, Ministry of Finance
Government of the People's Republic of Bangladesh**

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The Competency-based Learning Material (Student Guide) for Basic Techniques of Yarn Manufacturing is a document, aligned to its applicable competency standard, for providing training consistent with the requirements of industry in order for individuals who graduated through the established standard via competency-based assessment to be suitably qualified for a relevant job.

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How to Use this Competency-based Learning Material

Welcome to the competency-based learning material for Basic Techniques of Yarn Manufacturing for use in textile works. These modules contain training materials and learning activities for you to complete in order to become competent and qualified as an operator.

There are six (6) modules that make up this course which comprises the skills, knowledge and attitudes required to become a skilled worker including:

1. Interpret the basics of yarn manufacturing
2. Operate blow room machine
3. Prepare materials for spinning
4. Perform spinning operation
5. Perform spinning and finishing
6. Carry out quality control of materials

As a learner, you will be required to complete a series of activities in order to achieve each learning outcome of the module. These activities may be completed as part of structured classroom activities or simulated workplace demonstrations.

These activities will also require you to complete associated learning and practice activities in order to gain the skills and knowledge needed to achieve the learning outcomes. You should refer to **Learning Activity** pages of each module to know the sequence of learning tasks and the appropriate resources to use for each task.















This page will serve as the road map towards the achievement of competence. If you read the **Information Sheets**, these will give you an understanding of the work, and why things are done the way they are. Once you have finished reading the Information Sheets, you will then be required to complete the **Self-Check Quizzes**.

The self-check quizzes follow the Information Sheets in this learning guide. Completing the self-check quizzes will help you know how you are progressing. To check your knowledge after completion of the Self-Check Quizzes, you can review the **Answer Key** at the end of each module.

You are required to complete all activities as directed in the **Learning Activity and Information Sheet**. This is where you will apply your newly acquired knowledge while developing new skills. When working, high emphasis should be laid on safety requirements. You will be encouraged to raise relevant queries or ask the facilitator for assistance as required.

When you have completed all the tasks required in this learning guide, formal assessment will be scheduled to officially evaluate if you have achieved competency of the specified learning outcomes and are ready for the next task.

List of Icons

Icon Name	Icon
Module content	
Learning outcomes	
Performance criteria	
Contents	
Assessment criteria	
Resources required	
Information sheet	
Self-check Quiz	
Answer key	
Activity	
Video reference	
Learner job sheet	
Assessment plan	
Review of competency	

Module 1: Interpret the basics of yarn manufacturing



MODULE CONTENT

Module Descriptor: This module covers the skills, knowledge and attitudes to interpret the basics of yarn manufacturing. It specifically includes understanding the yarn manufacturing process, identifying raw materials, tools, equipment, and machines, and interpreting common technical terms in the workplace.

Nominal Duration: 24 hours



LEARNING OUTCOMES:

Upon completion of the module, the student/trainee will be able to:

- 1.1 Understand yarn manufacturing process
- 1.2 Identify raw materials
- 1.3 Identify tools, equipment and machines
- 1.4 Interpret technical terms



PERFORMANCE CRITERIA:

1. Yarn manufacturing processes is identified and explained.
2. Role of an operator in a textile mill is explained.
3. Types of yarn are identified.
4. Lay-out of spinning floor is identified and illustrated.
5. Types of fibres are identified.
6. Types of impurities are identified.
7. Fibre contamination is identified and described.
8. Tools and equipment required for spinning are identified.
9. Different machines required for spinning are identified.
10. Technical terms used in spinning process are identified.
11. Technical terms are interpreted.



Learning Outcome 1.1 – Understand Yarn Manufacturing Process



Contents:

- Yarn manufacturing process
- Types of yarns:
 - Carded
 - Combed
 - Ring
 - Rotor



Assessment criteria:

1. Yarn manufacturing process is identified and explained.
2. Types of yarns are identified.



Resources required:

Students/trainees must be provided with the following resources:

- **Materials:** Yarns



Learning Activity 1.1.1

Learning Activity	Resources/Special Instructions/References
Understand yarn manufacturing process	<ul style="list-style-type: none"> ▪ Information Sheets: 1.1.1, 1.1.2 ▪ Self-Check Quizzes: 1.1.1, 1.1.2 ▪ Answer Key: 1.1.1, 1.1.2



INFORMATION SHEET 1.1.1

Learning Objective: To know the yarn manufacturing process.

Blow room line: The objects of the blow room line is to open the fibres into very fine tufts, eliminate most of the impurities, eliminate dust and provide a good blend. A blow room installation has a sequence of machines as Openers, Cleaners, Foreign part separators, Mixers and Separators.

Carding: Carding is a mechanical process that disentangles, cleans and intermixes fibres to produce a continuous web or sliver suitable for subsequent processing.

Combing: Combing is a method for preparing more parallel combed fibre for spinning.

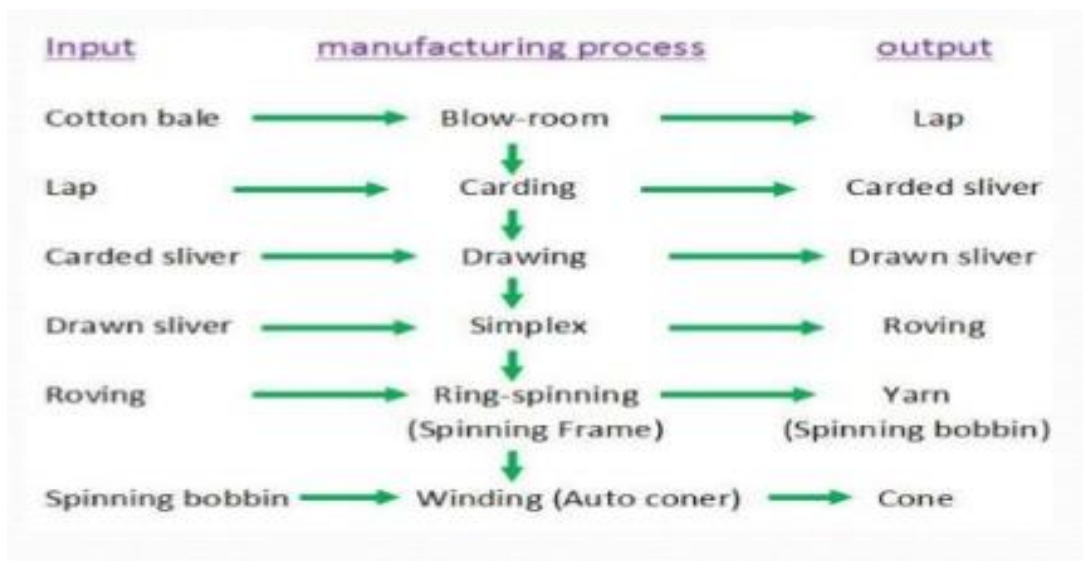
Drawing: Drawing, also called drafting in yarn manufacturing process of attenuating the loose assemblage of fibres called sliver by passing it through a series of rollers, thus straightening the individual fibres and making them more parallel.

Simplex: This machine is used to make roving from sliver and small amount of twist is given into the fibres.

Ring frame: The machine in which the final draft is given to the roving and converted to yarn is called ring frame.

Winding: The formation of big yarn packages which can be smoothly unwound, during next process is known as winding. Winding is the most essential process both of yarn manufacturing and fabric manufacturing. The main purpose of winding is to make a suitable package for both woven and knitted fabric production.

Flow chart of carded yarn:



Feed	Process / Machine	Output
 Bale	 Blow room	 Chute/Fibre mat
 Chute/Fibre mat	 Carding	 Carded sliver



Carded sliver



Breaker drawing



Breaker drawn sliver



Breaker drawn sliver



Finisher Drawing



Finisher Drawn Sliver



Finisher Drawn Sliver



Simplex



Roving



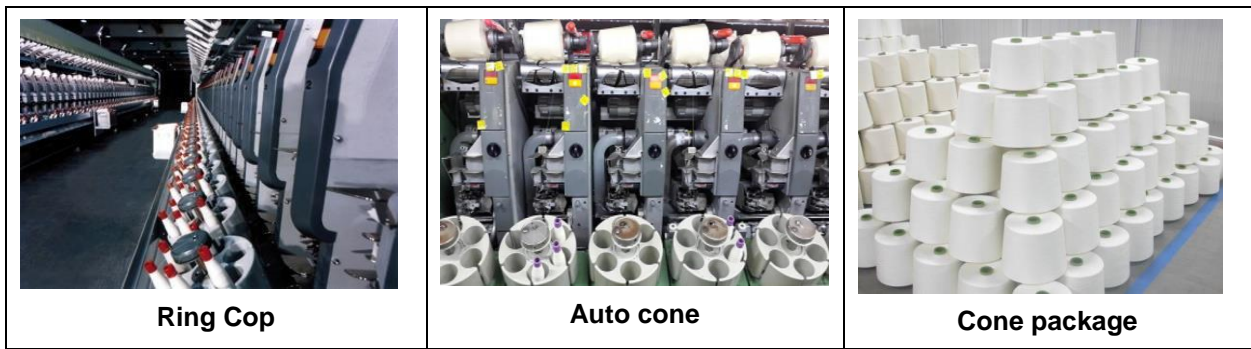
Roving



Ring frame






Yarn (Ring frame)



Flow chart of combed yarn:

<u>Input</u>	<u>Manufacturing Process</u>	<u>Output</u>
Cotton bale	Blow room	Lap
Lap	Carding	Carded sliver
Carded sliver	Breaker drawing	Breaker drawn sliver
Breaker drawn sliver	Lap former	Mini lap
Mini lap	Combing	Combed sliver
Combed sliver	Finisher drawing	Finished drawn sliver
Finished drawn sliver	Simplex / Speed frame	Roving
Roving	Ring frame	yarn
Yarn	winding	Cone or cheese package

Feed	Process/Machine	Output
		
Bale	Blow room	Chute/Fibre mat



Chute/Fibre mat



Carding



Carded sliver



Carded sliver



Breaker drawing



Breaker drawn sliver



Breaker drawn sliver



Lap former



Mini lap



Mini lap



Comber



Combed sliver



Combed sliver



Finisher drawing



Finisher drawn sliver



Flow chart of rotor yarn:

Manufacturing process	Product
Blow room	Lap
Carding machine	Sliver
Breaker draw frame	Breaker drawn sliver
Finisher draw frame	Finisher drawn sliver
Rotor spinning frame	Yarn



SELF-CHECK QUIZ 1.1.1

Fill in the blanks with the correct answer.

- _____ is used to open the fibres into very fine tufts.
- _____ is used to produce a continuous web or sliver.
- _____ is used to make the fibres more parallel.
- _____ used to produce yarn.
- _____ is used to produce a suitable package for both woven and knitted fabrics.



INFORMATION SHEET 1.1.2

Learning Objective: to identify different types of yarns.

Different types of yarns are produced in the spinning industries. They are as follows:

Carded yarn: Carded yarn is a cotton yarn which has been carded. This type of yarn contains a wide range of fibre length. As a result, carded yarn is not so uniform. It should be noted here that, carded yarns are considerably cheaper and are used in coarse and medium counts for weaving and knitting.

Combed yarn: The combed yarn is a yarn which is produced by the combing process. This yarn is finer than carded yarn. Generally combing produced 60 counts or more than 60 count yarn. But sometimes 32 counts or 40 counts yarn also produced by combing process. It is high-quality yarn and it is more expensive compared with carded yarn because its combining process is time intensive.

Ring yarn: Ring yarn is processed in a continuous system of spinning in which twist is inserted into a yarn by using a circulating traveller. The yarn is wound on to the package since the rotational speed of the package is greater than that of the traveller.

Rotor yarn: Rotor yarn is coarser than carded or combed yarn. The count of rotor yarn is very low. Most of rotor yarn count is below 20's but highest yarn count may be 40's. Price of rotor yarn also low from carded and combed yarn.



SELF-CHECK QUIZ 1.1.2

Check your understanding by answering the following questions:

1. What is carded yarn?
2. What is combed yarn?
3. What are the differences between ring and rotor yarn?



Learning Outcome 1.2 – Identify Raw Materials



Contents:

- Types of fibres:
 - Cotton
 - Cotton/polyester blend
 - Cotton/viscose blend
- Types of impurities:
 - Cotton seeds
 - Dry leaves
 - Broken metal parts
 - Packing materials
 - Foreign matters
- Fibre contamination:
 - Immature fibres
 - Dead fibres
 - Foreign fibres
 - Coloured fibres
 - Dry leaves



Assessment criteria:

1. Types of fibres are identified as per job requirement.
2. Types of impurities are identified.
3. Fibre contamination is identified and described.



Resources required:

Students/trainees must be provided with the following resources:

- **Personal protective equipment (PPE):** Safety cloth/apron, hand gloves, dust mask, safety glasses
- **Materials:** Fibres



LEARNING ACTIVITY 1.2.1

Learning Activity	Resources/Special Instructions/References
Identify different types of fibres, impurities and fibre contamination	<ul style="list-style-type: none"> ▪ Information Sheet: 1.2.1 ▪ Self-Check Quiz: 1.2.1 ▪ Answer Key: 1.2.1



INFORMATION SHEET 1.2.1

Learning Objective: to identify different types of fibers, impurities and fibre contamination.

Types of fibres:

Cotton: Cotton is a natural cellulosic fibre that grows in a boll, or protective case, around the seeds of the cotton plants. Different types of cotton fibres are found with different fibre length.

- Short staple cotton is between 3/8" to 15/16" (.95cm to 2.4cm) in length
- Medium staple cotton is between 1" to 1-1/8" (2.54cm to 2.86cm) in length
- Long staple cotton is between 1-3/16" to 2-1/2" (3cm to 6.35cm) in length.



Fig: Cotton fibre

Cotton/polyester blend: Cotton is a natural fibre and polyester is a man-made or synthetic fibre. Cotton and polyester are blended or mixed according to required ratio. The blending ratio may be 65% Cotton and 35% Polyester.

Cotton/viscose blend: Viscose is a man-made, natural polymeric cellulose or regenerated cellulose filament or staple fibre. Cotton and viscose blend mean cotton and viscose fibres are blended or mixed according to required ratio.

Types of impurities:

Cotton seed: It is the dry parts of cotton seeds.

Dry leaves: It is the small portion of dry leaves.

Broken metal parts: Sometimes broken metal part of different sizes are found as impurities.

Packing materials: Paper or plastic pieces are found in the fibres.

Foreign matters: Other fibres or any other materials are mixed with the fibres.

Fibre contamination:

Immature fibres: If cotton fibres are not matured enough.

Dead fibres: There are some fibres which are different in colour

Foreign fibres: Any fibres mixed with cotton fibres.

Coloured fibres: If any coloured fibres are mixed with cotton fibres.



SELF-CHECK QUIZ 1.2.1

Fill in the blanks with the correct answer:

1. _____ is a natural cellulosic fibre.
2. 65% cotton and 35% polyester means _____ .
3. _____ is a man-made, natural polymeric cellulose or regenerated cellulose.



Learning Outcome 1.3 – Identify Tools, Equipment and Machines



Contents:

- Tools and equipment's required for spinning:
- Different machines required for spinning:



Assessment criteria:

1. Tools and equipment required for spinning are identified.
2. Different machines required for spinning are identified.



Resources required:

Students/trainees must be provided with the following resources:

- **Personal protective equipment (PPE):** helmet, safety shoes, safety cloth/apron, hand gloves, dust mask, safety glasses, ear plugs/ear muffs
- **Tools and equipment:** Pocket tape, adjustable wrench, files, hacksaw, hammer, pliers, screw drivers and hand pullers, bobbin, bobbin holder, can and trolley



LEARNING ACTIVITY 1.3.1

Learning Activity	Resources/Special Instructions/References
Identify tools and equipment required for spinning	<ul style="list-style-type: none"> ▪ Information Sheet: 1.3.1, 1.3.2 ▪ Self-Check Quiz: 1.3.1, 1.3.2 ▪ Answer Key: 1.3.1, 1.3.2



INFORMATION SHEET 1.3.1

Learning Objective: to know the tools and equipment's required for spinning.

1. Pocket tape: A pocket tape or measuring tape is a flexible ruler used to measure distance or length.



2. Adjustable wrench: Adjustable wrench is an open-end wrench with a movable jaw, allowing it to be used with different sizes of fastener head (nut, bolt, etc).



3. Hammer: Hammer is a tool used to drive nails into wood.



4. Allen key (L- key): Allen key is a simple tool used to drive bolts and screws with hexagonal sockets in their heads.



5. Bobbin: A bobbin is a spindle or cylinder on which wire, yarn, thread or film is wound.



6. Bobbin holder: It's a tool used to hold the bobbin.



7. Can: It's a container to receive the sliver and roving used in spinning.

8. Trolley: It's a tool used to carry yarn package.



SELF-CHECK QUIZ 1.3.1

Fill in the blanks with appropriate answers:

1. _____ is used to fasten the head of nut and bolts.
2. _____ is used to wind the yarn on it.
3. Trolley is used to carry _____.
4. Can is used for _____.



Information Sheet 1.3.2

Learning Objective: to know the machines required for spinning.

Blow room machine: It's a machine line used to open the fibres and at the same time, cleaning of fibres is also done.

Carding machine: Carding machine is used to individualize the fibres and make carded sliver.

Breaker draw frame machine: Used to make drawn sliver and make the fibres parallel.

Lap former machine: Used to make mini lap which will be fed into the comber machine.

Comber machine: This machine is used to make combed sliver which will be used for manufacturing combed yarn.

Finisher draw frame machine: Used to prepare drawn sliver for more parallel fibres.

Simplex/speed frame machine: Used to produce roving by drafting and twisting.

Ring frame/rotor spinning machine: Used to make yarn.

Auto coner machine: It is used to make the cone packages.



SELF-CHECK QUIZ 1.3.2

Fill in the blanks with appropriate answers:

1. _____ is used to open the fibres.
2. _____ is used to individualize the fibres.
3. Comber machine used to make _____.
4. Auto coner is used for _____.



Learning Outcome 1.4 – Interpret Technical Terms



Contents:

- Technical terms used in spinning process:
 - Inching motion
 - Creeling
 - Piecing
 - Doffing



Assessment criteria:

1. Technical terms used in spinning process are identified as per job requirement.



LEARNING ACTIVITY 1.4.1

Learning Activity	Resources/Special Instructions/References
Define technical terms used in spinning	<ol style="list-style-type: none"> 1. Information Sheet: 1.4.1 2. Self-Check: 1.4.1 3. Answer Key: 1.4.1



Information Sheet 1.4.1

Learning Objective: to define the technical terms of spinning.

General information:

1. Inching motion: It is the motion used to run the machine in slow speed. Before going to production, sometimes machine are run in inching motion to adjust the materials and other parameters.
2. Creeling: Creeling is the process of feeding full packages in the input side of the machine.
3. Piecing: Piecing is the joining of broken ends.
4. Doffing: Doffing is the process of removing full packages from delivery side of the machine and replaces full packages with empty packages.



SELF-CHECK QUIZ 1.4.1

Check your understanding by answering the following questions:

1. What is creeling.
2. Why piecing is done?
3. What is doffing?



ANSWER KEYS

ANSWER KEY 1.1.1

1. Blow room line
2. Carding machine
3. Combing machine
4. Ring frame
5. Winding

ANSWER KEY 1.1.2

1. Carded yarn is normally processed without combing and coarser yarn is produced.
2. Combed yarn is more parallel and finer count is possible than carded yarn.
3. Ring yarn has more twist and processed in ring spinning frame and rotor yarn is processed in rotor spinning frame with coarser count.

ANSWER KEY 1.2.1

1. Cotton
2. Blend of cotton and polyester
3. Viscose

ANSWER KEY 1.3.1

1. Adjustable wrench
2. Bobbin
3. Yarn package
4. Receiving sliver and roving

ANSWER KEY 1.3.2

1. Blow room machine
2. Carding machine
3. Comber sliver
4. Making cone.

ANSWER KEY 1.4.1

1. Creeling is the process of feeding full packages in the input side of the machine.
2. When sliver or roving or yarn breaks, piecing is done to join those broken heads.
3. Doffing is the process of removing full packages from delivery side of the machine and replaces full packages with empty packages.

Module 2: Operate blow room machine



MODULE CONTENT

Module Descriptor: This module covers the knowledge, skills and attitudes to operate blow room machine which includes carrying out bale opening, performing cleaning operation, operating the blow room machine, carrying out blending of different fibres and disposing of waste material.

Nominal Duration: 56 hours



LEARNING OUTCOMES:

Upon completion of the module, the student/trainee will be able to:

- 2.1 Carry out bale opening operation
- 2.2 Perform cleaning operation
- 2.3 Operate blow room line machine
- 2.4 Carry out blending of different fibres
- 2.5 Dispose of waste material



PERFORMANCE CRITERIA:

1. Materials are identified according to job requirements.
2. Tools are identified and selected according to job requirements.
3. The fibres are brushed to remove dust during loading and unloading.
4. Fibres are laid down to bale management.
5. Natural impurities are removed.
6. Foreign materials are removed.
7. Fibres are opened.
8. Machine is operating as per standard operating procedure.
9. Machine is stopped in case of any emergency.
10. Control points of blow room line machine are identified.
11. Fibres from different bales are blended.
12. Different types of fibres are blended.
13. Waste material from machine is Identified.
14. Waste material is separated and disposed of as per standard operating procedure.



Learning Outcome 2.1 – Carry Out Bale Opening Operation



Contents:

- Materials used in bale opening:
 - Bales
 - Fibres
- Tools used during opening:
 - Wire stripper
 - Adjustable wrench
 - Hammers
 - Pliers
 - Screwdrivers
 - Scissors



Assessment criteria:

1. Materials are identified according to job requirements.
2. Tools and equipment are gathered and checked in accordance with job requirements.
3. Appropriate personal protective equipment (PPE) is used and demonstrated according to job requirements.
4. Fibres are laid down according to bale management.



Resources required:

Students/trainees must be provided with the following resources:

- **Personal protective equipment (PPE):** helmet, safety shoes, safety cloth, hand gloves, dust mask, safety glasses
- **Tools and equipment:** Blow room machine, pocket tape, wire stripper, adjustable wrench, hammers, pliers, screw drivers and scissors.
- **Materials:** Fibres



LEARNING ACTIVITY 2.1.1

Learning Activity	Resources/Special Instructions/References
Identify tools and equipment used for yarn manufacturing	<ul style="list-style-type: none">Information Sheet: 2.1.1Self-Check Quiz: 2.1.1Answer Key: 2.1.1



INFORMATION SHEET 2.1.1

Learning Objective: to identify tools and equipment required for spinning.

Personal protective equipment (PPE):

1. **Hand gloves:** A glove is a garment covering the whole hand. Gloves usually have separate sheaths or openings for each finger and the thumb.

Different types of chemicals are used in different sections of the factory specially in sizing like PVC, CMC, Power bond etc. If these come in contact of body, they can cause skin diseases. To prevent these gloves are used.



2. **Dust mask:** A lot of dust is present in some parts of the factory such as spinning mill. These dusts can enter the lungs and cause asthma, bronchitis etc. So dust masks are used.



3. **Ear plug:** Loud sounds cause hearing problems and in some causes hearing disability. Ear plugs are used in the parts of factory where there is presence of loud sounds like spinning section.



4. **Apron:** Apron is used to protect oneself from different objects in workplace.



Tools and equipment:

Following tools and equipment are used in the blow room machine.

Blow room machine

Blow room machine is used in the spinning industry to make chute mat or lap.



Pliers



Measurement tape



Wrenches



Materials:

Mainly cotton fibres are used.



SELF-CHECK QUIZ 2.1.1

Check your understanding by answering the following questions:

1. Write the name of some PPE used in the spinning mill.
2. Why ear plug is essential in the spinning mill?



LEARNING ACTIVITY 2.1.2

Learning Activity	Resources/Special Instructions/References
Identify different machine parts of blow room	<ul style="list-style-type: none"> Information Sheet: 2.1.2 Self-Check Quiz: 2.1.2 Answer Key: 2.1.2



INFORMATION SHEET 2.1.2

Learning Objective: to identify different machine parts of blow room machine.

Blow room is the first step of yarn production in spinning mills. A section in which compressed bales are opened, cleaned and blending or mixing to form uniforms lap of specific length is called Blow room section. The cleaning efficiency of blow room is 40 to 70%. This is the first section of spinning line for spinning of cotton yarn.

Functions of blow room machine:

1. Opening the compressed bales of fibre and making the cotton tuft a small size as far as possible.
2. Detecting the metal objects and fire in fibre.
3. Cleaning the fibre by removing the dust, dirt, broken seeds etc. and other foreign materials from the fibers.
4. Mixing and blending of different classes or grades of fibers.
5. Removing foreign fibers and plastic contaminations
6. Uniform feeding to the next stage.

Two types of blow room machine are used in our country. They are:

1. Reiter blow room line
2. Trutzschler blow room line

Following machines are used in the blow room line:

For Reiter	For Trutzschler	For conventional
Unifloc	BDT (Blendomart)	Automatic bale opener
Metal and fire detector	Electronic metal separator (SP-EM)	Automatic blender
Unclean	Pre-cleaner (CL-P)	Step cleaner

Unimix	Universal Mixer (MX-U)	AXI Flow opener
Uniflex	Cleaner cleanomat (CL-C3)	Procupine opener
Loptex	Foreign parts separator (SP-FP)	Hopper feeder
		Scatcher

Functions of Trutzschler blow room line are described below:

Blendmart	To separate cotton fibers from bale.
Electronic metal separator (SP-EM)	The electronic Metal Separator SP-EM helps to protect the cleaners and cards from metal parts at the interface between bale work-off and mixers/cleaners.
Pre-cleaner (CL-P)	In this zone, basic function is to open the fiber tuft to smaller size and to clean the tuft removing big size of trash but smaller size of impurities which are trapped between fibers is not removed here. Gentle beating action but no picking is performed here.
Universal Mixer (MX-U)	In this zone, main function is to blend the raw material of different quality to equalize and even the mean quality of delivered material. Because natural fiber generally remains in variation in quality.
Cleaner cleanomat (CL-C3)	In this zone, basic function is to open the fiber tuft to smallest size and to clean the tuft to the greater extent removing even smallest size of trash and dust which are trapped between fibers.
Foreign parts separator (SP-FP)	The cameras detect the distorted colors or contrasts generated by the polarization in light polypropylene and transparent or semi-transparent PE foils.

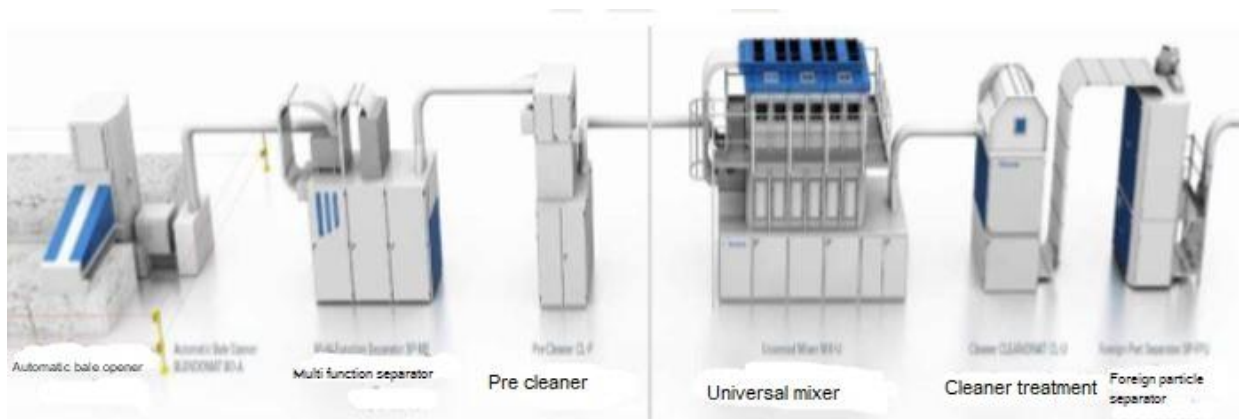


Fig: Trutzschler blow room line

Functions of Reiter blow room line are described below:

Uni flex	To separate cotton fibers form bale
Uni clean	To remove large size materials
Uni mix	To mix the cotton fibers uniformly
Uni flex	To remove small particles

Different machines:

Different machines are arranged in three sections from bale breaker to scutcher.

1. Blending section
2. Opening and cleaning section
3. Lap forming section:
 - 1) Blending section machinery:
 - Blending
 - West blender
 - Bale blender
 - Mixing bale opener
 - Multi bale opener
 - 2) Opening and cleaning section machinery:
 - Step cleaner
 - Procupine cleaner
 - Criton opener
 - Two bladed beater
 - Three bladed opener
 - Crisner opener
 - ERM opener
 - Mono cylinder cleaner
 - Air steam cleaner
 - 3) Lap forming unit:
 - Scacher
 - Auto doffer
 - Lap roller extractor
 - 4) Other equipment:
 - Cage
 - Piano feed regulator
 - Two or three way distributor
 - Lap formation
 - Cotton conveying



SELF-CHECK QUIZ 2.1.2

Check your understanding by answering the following questions:

1. Write down the name of different machines in the blow room.
2. Write down the functions of pre-cleaner.
3. What are foreign particles?



LEARNING ACTIVITY 2.1.3

Learning Activity	Resources/Special Instructions/References
Identify different control points of blow room and operate different parts of bale opener	<ul style="list-style-type: none"> Information Sheet: 2.1.3 Self-Check Quiz: 2.1.3 Answer Key: 2.1.3 https://www.textileschool.com › Yarn



INFORMATION SHEET 2.1.3

Learning Objective: to identify different control points of blow room and operate different parts of bale opener.

Basic operations in blow room are given below:

1. **Opening:** Opening is the first operation in the blow room carried out to the stage of Flocks. In the stages of the opening, machines with an opening function have the task of separating clumps of fibre into smaller ones. The sizes of the clumps, and of the teeth that deal with them, are progressively reduced. In general terms, grasping clumps of fibres with sets of teeth and dragging the clumps across another set of teeth or grids perform the opening function.
2. **Cleaning:** With cotton, there are often seed coat fragments attached to them. It is difficult to remove some of the extraneous matter without vigorous mechanical action and without adequate opening. Every time a clump of fibers is divided, a new surface is exposed from which it is relatively easy to remove the loose unwanted matter (trash).
3. **Mixing:** It is the third tasks of blow room section used in spinning. Fibres can be blended here at different stages of the process. In case of blending, starting of the process plays an important role. Intensive blending in a suitable blending machine must be carried out after separate flock extraction from individual bales of layout. This type of blending operation must collect the sequentially arriving bunches of fibres from individual bales and mixes them thoroughly.

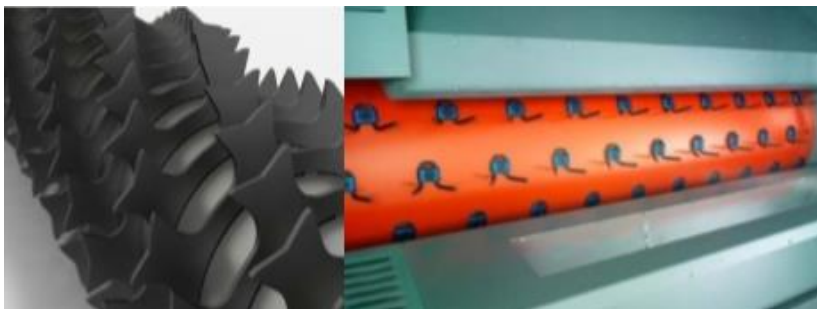


Fig: Opening roller (left), Cleaning roller (right)

Introduction of different types of bale opener:

In blow room at first 40-60 bales are laid down. This process is called lay down. Then the fibers are picked from lay down automatically by bale opener. The automatic bale openers available in our country are given below:

1. Blendomat (Trutzschler)
2. Unifloc (Rieter)

Beside this manual bale opener is also used for feeding small lots.



Fig: Small lots of fibers are feeding manually



SELF-CHECK QUIZ 2.1.3

Check your understanding by answering the following questions:

1. What are the basic functions of the blow room machine?
2. What is opening?



Learning Outcome 2.2 – Perform Cleaning Operation



Contents:

- Natural impurities
- Foreign materials
- Fibres opening



Assessment criteria:

1. Tools and equipment are gathered and checked in accordance with job requirements.
2. Appropriate personal protective equipment (PPE) is used and demonstrated according to job requirements.
3. Natural impurities and foreign materials are removed as per job requirements
4. Fibres are opened as required.



Resources required:

Students/trainees must be provided with the following resources:

- **Personal protective equipment (PPE):** safety cloth, hand gloves, dust mask, safety glasses and ear plugs
- **Tools and equipment:** Blow room machine, pocket tape, wire stripper, adjustable wrench, hammers, pliers, screw drivers and scissors
- **Materials:** Fibres



LEARNING ACTIVITY 2.2.1

Learning Activity	Resources/Special Instructions/References
To perform cleaning operation	<ul style="list-style-type: none"> ▪ Information Sheet: 2.2.1 ▪ Self-Check Quiz: 2.2.1 ▪ Answer Key: 2.2.1



INFORMATION SHEET 2.2.1

Learning Objective: to perform cleaning operation.

There are different types of impurities in the fibres. They are

1. Natural impurities:
 - Dry leaves
 - Broken seeds
 - Dead leaves
2. Foreign materials:
 - Metal parts
 - Packing materials

Some of these impurities are removed by the operator and some are cleaned in the pre-cleaner section.



SELF-CHECK QUIZ 2.2.1

Check your understanding by answering the following questions:

1. Write the name of section used for fibre cleaning.
2. What are the natural impurities?



Learning Outcome 2.3 – Operate Blow Room Line Machine



Contents:

- Machine operation (i.e. starting and stopping) as per standard operating procedure
- Control points of blow room line machine:
 - Brake system
 - Beater speed
 - Feed zone
 - Delivery zone
 - Start and stop
 - Grid bar



Assessment criteria:

1. Tools and equipment are gathered and checked in accordance with job requirements
2. Appropriate personal protective equipment (PPE) is used and demonstrated according to job requirements.
3. Machine is operated as per standard operating procedure.
4. Machine is stopped in case of any emergency.
5. Control points of blow room line machine are identified.



Resources required:

- **Personal protective equipment (PPE):** safety cloth, hand gloves, dust mask, safety glasses and ear plug
- **Tools and equipment:** Blow room machine, pocket tape, wire stripper, adjustable wrench, hammers, pliers, screw drivers and scissors
- **Materials:** Fibres



LEARNING ACTIVITY 2.3.1

Learning Activity	Resources/Special Instructions/References
To operate blow room line machine (pre-cleaner, multi-mixer, fine cleaner, condenser, separator)	<ul style="list-style-type: none"> ▪ Information Sheet: 2.3.1 ▪ Self-Check Quiz: 2.3.1 ▪ Answer Key: 2.3.1



INFORMATION SHEET 2.3.1

Learning Objective: to operate blow room line machine (pre-cleaner, multi-mixer, fine cleaner, condenser, separator).

Blow room machine

Different parts and operating system of pre-cleaner:

Different types of pre-cleaner are used to remove large particles or impurities from cotton fibres.

1. Step cleaner: it is a conventional machine. Six beaters are used for cleaning fibres.

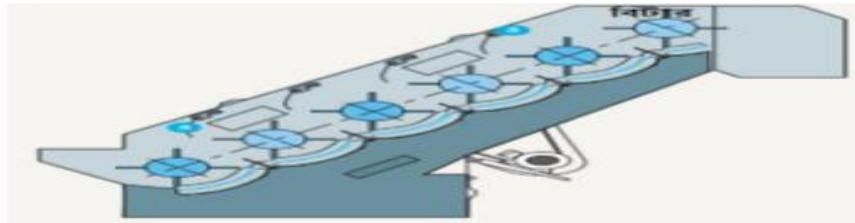


Fig: Step cleaner

2. Uni-clean (Reiter): Only one cylinder is used in this machine for cleaning.
3. Maxi-flow (Trutzchler).



Fig: Trutzschler Pre-cleaner (Maxi-flow)

Different types of fine cleaning machines are used for removing small impurities. Fine cleaning is done after mixing. Modern fine cleaning machines are :

- (i) Uni-flex (Reiter)

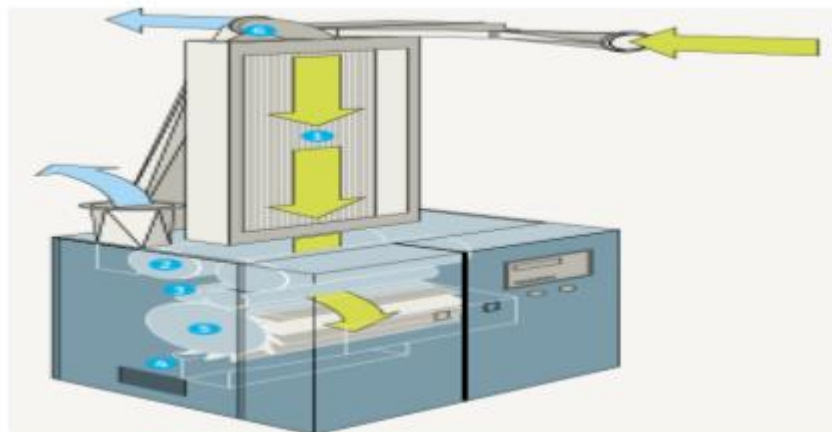


Fig: Uni-flex

(ii) Cleanomet (Trutzschler)



Fig: Cleanomet (Trutzschler)

(iii) Multi-mixer: Fibres are fed in the blow room from many bales and fibres have different properties. So, they are mixed together to get the uniform fibres in the yarns.



Fig: Trutzschler multi-mixer

Main parts of the mixer machine are:

- (i) Chute feed
- (ii) Chamber
- (iii) Bottom lattice
- (iv) Top lattice
- (v) Opening roller
- (vi) Delivery chute

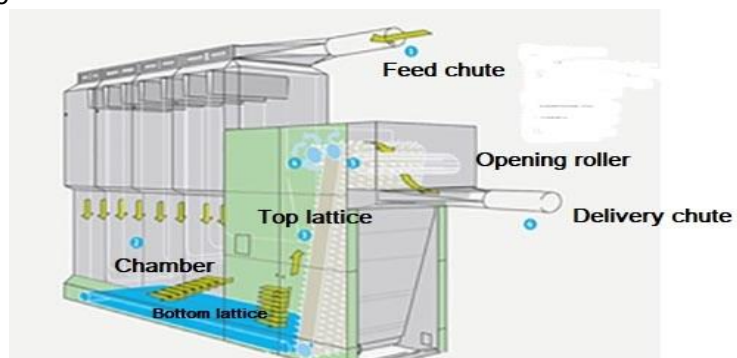


Fig: Different parts of Reiter Uni-mix

- (iv) Condenser and separator: Cotton is carried by air in the blow room. The fibres are taken from the last roller through the condenses, which creates the suction and then feed them to the card machine. The condenser is very important part of the blow room. Its main function is to take the fibres from the back part and supply them to the next part.

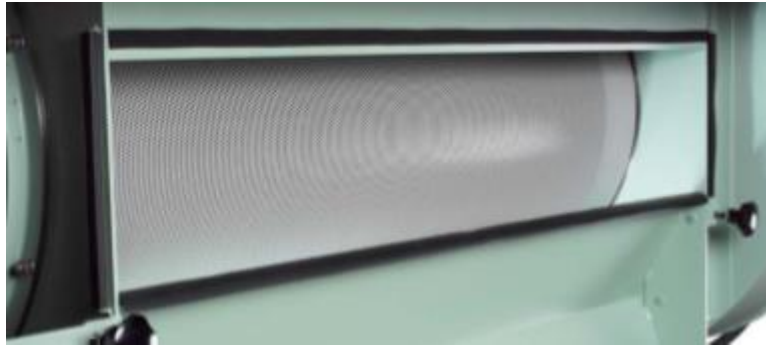


Fig: Condenser

There is a perforated drum and a stripping roller in the condenser. Air is blown through the drum by the help of a fan and fibres are fed to the machine by the help of stripping roller.

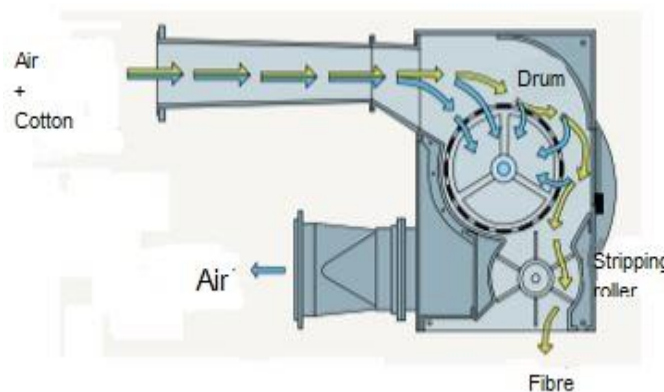


Fig: Separation of fibre and cotton

Separator

Different types of separators are used to remove the foreign materials of fibres.

1. Metal part separator: Iron or metal parts are harmful for spinning. If these metal parts are interred into the carding machine, it can be damaged. So, these should be separated. Mainly two types of separators are used.
 - (i) Magnetic: Iron or metal parts are separated by the magnet.
 - (ii) Electronic: Separation is done by electricity.

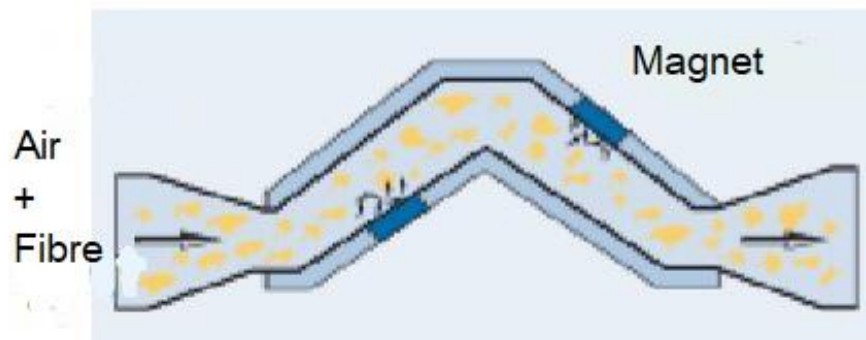


Fig: Magnetic part separator

- Dust separator: Dust is removed from fibres. When fibres are passed through perforated duct line, dusts are separated by the help of air.

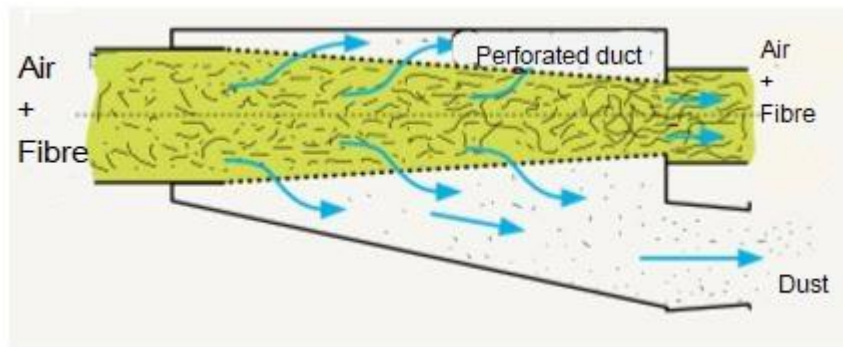


Fig: Dust separator

- Foreign fibre separator: Different types of foreign fibres are mixed with the fibres. As, polypropylene, polyethylene and feather. These foreign fibres are not dyed with the dyes used for cotton. So, these fibres are not dyed when cotton fibres are dyed and they look white. For this reason, foreign fibres separator is used. In modern blow room machine, one common separator is used to remove all types of materials.

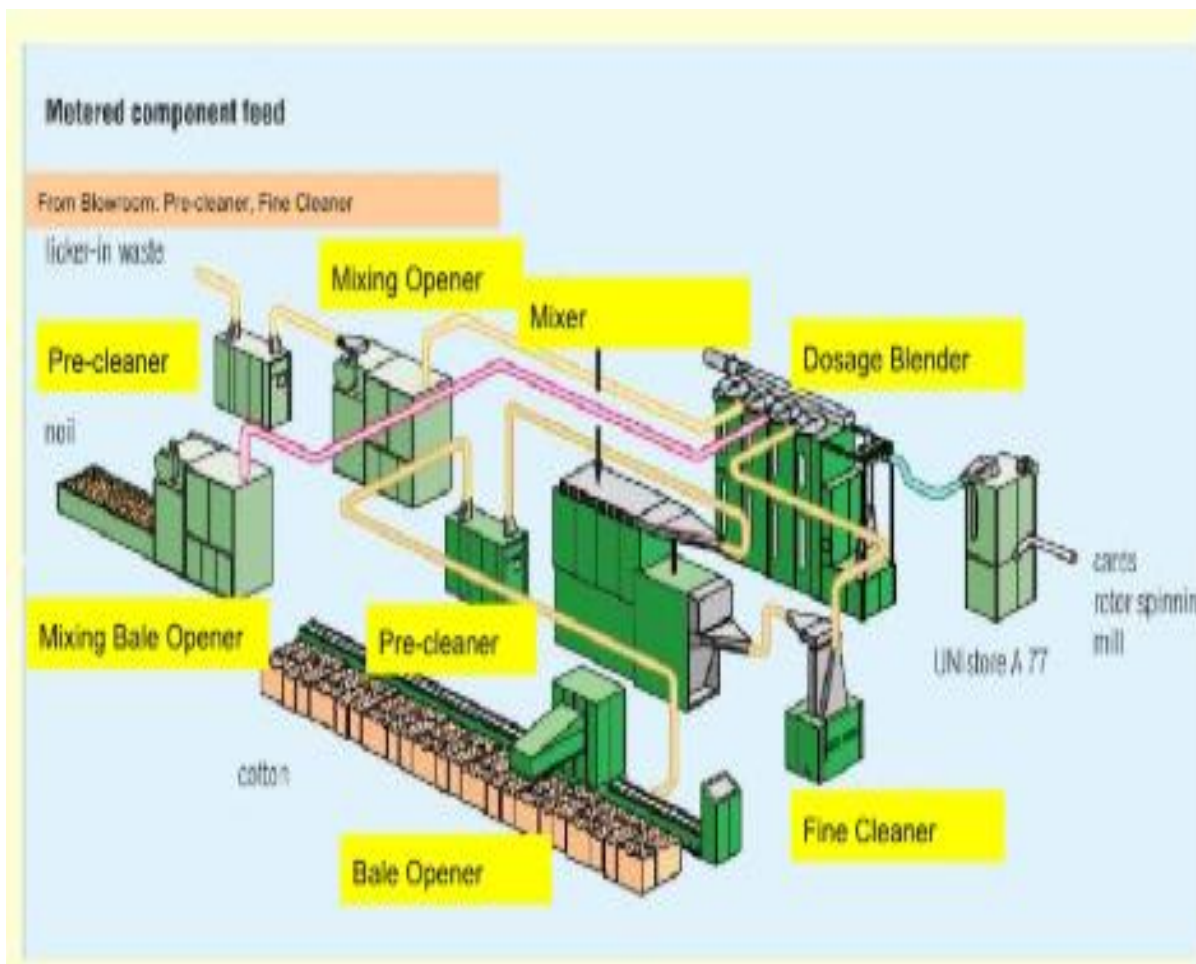


Fig: Blow room line



SELF-CHECK QUIZ 2.3.1

Check your understanding by answering the following question:

1. What is the function of foreign fibre separator?
2. Why step-cleaner is used?
3. What is the importance of multi-mixer?
4. Write the name of some separators.



Learning Outcome 2.4 - Carry Out Blending of Different Fibres



Contents:

- Fibres blending from different bales



Assessment criteria:

1. Fibres from different bales are blended.
2. Different types of fibres are blended.



Resources required:

Students/trainees must be provided with the following resources:

- **Personal protective equipment (PPE):**, safety cloth, hand gloves, dust mask, safety glasses and ear plugs
- **Tools and equipment:** Blow room machine, pocket tape, wire stripper, adjustable wrench, hammers, pliers, screw drivers and scissors
- **Materials:** Fibres



LEARNING ACTIVITY 2.4.1

Learning Activity	Resources/Special Instructions/References
To carry out blending of different fibres	<ul style="list-style-type: none"> ▪ Information Sheet: 2.4.1 ▪ Self-Check Quiz: 2.4.1 ▪ Answer Key: 2.4.1



INFORMATION SHEET 2.4.1

Learning Objective: to carry out blending of different fibres.

Blending: When different types of fibres (it may be equal or nearly equal graded) are mixed together are within a particular ration then the mixture is known as blending.

Mixing: When same kind but different grades of fibers are mixed together then it is termed as mixing. Blending and mixing influences the reduction of the final product through blend composition, availability of fibre quality and inherent fibre properly variations.

Comparison Between Mixing and Blending in Blow Room

No.	Mixing	Blending
1	Here, same kind but different grades of fibre mixed together.	Here, equal or nearly equal graded of fibre are mixed together within a definite ratio.
2	There is no particular ratio of fibres to mix with each other.	There must be a particular ratio of fibres to mix with each other.
3	It is costly process.	It is cheap process than mixing.
4	Example: Low graded cotton + high graded cotton = Mixing	Example: 35% polyester + 65% cotton = Blending

Objects of Mixing and Blending in Spinning:

Various objects of mixing and blending have discussed in the following:

1. Economy: Blending and mixing influences the reduction of the final product through blend composition, availability of fibre quality and inherent fibre properly variations.
2. Processing performances: It helps in processing of the below processes:
 - Carding: Mixing and blending influences the process performances of carding through control of nep level variation, waste level variation, fly, roving twist variation, machine adjustment and static electricity formation.
 - Spinning: Mixing and blending influences the processing performances of spinning through control of yarn twist variation, machine adjustment and end breakage etc.
 - Warping and weaving: Mixing and blending influences the processing performance of warping and weaving through control of end breakage and machine adjustment etc.
 - Dyeing finishing: It influences the behaviours of dyeing and finishing through control of shrinkage variation and dye effects etc.
 - Functional properties: It influences the below properties:
 - a. Physical properties: It influences to increase tensile and tear strength, abrasion resistance, elasticity and strength etc.
 - b. Aesthetic properties: It influences to increase lustre, cover, appearance and colour etc.
 - c. Subjective properties: It increases comfort and the characteristics like abrasion resistance, handling and stretch etc.



SELF-CHECK QUIZ 2.4.1

Write the correct answer.

1. Define blending and mixing.
2. What are the objects of blending and mixing?



Learning Outcome 2.5 – Dispose of Waste Material



Contents:

- Identify and collect waste materials of the machine.
- Dispose of waste material



Assessment criteria:

1. Waste materials of the machine are identified.
2. Collected waste materials are disposed of.



Resources required:

Students/trainees must be provided with the following resources:

- **Personal protective equipment (PPE):** safety cloth, hand gloves, dust mask, safety glasses and ear plugs
- **Tools and equipment:** Blow room machine, pocket tape, wire stripper, adjustable wrench, hammers, pliers, screw drivers and scissors
- **Materials:** Fibres



LEARNING ACTIVITY 2.5.1

Learning Activity	Resources/Special Instructions/References
To dispose of waste materials	<ul style="list-style-type: none"> ▪ Information Sheet: 2.5.1 ▪ Self-Check Quiz: 2.5.1 ▪ Job Sheet 1 ▪ Answer Key: 2.5.1



INFORMATION SHEET 2.5.1

Learning Objective: to dispose of waste materials.

Different types of waste materials are collected and separated in the blow room machine:

1. Dropping-1
2. Dropping-2
3. Seeds
4. Leafs
5. Dust
6. Lap cut
7. Filter waste
8. Filter dust
9. Floor sweep

Wastage Reduction Procedure/Factors for Wastage Reductions:

1. Raw materials selection
2. Spindle speed
3. Setting (Rollers, R/T, Traveller cleaner etc)
4. Twist of yarn
5. Machinery condition
6. RH% and temperature
7. Proper material handling
8. Adequate supervision



SELF-CHECK QUIZ 2.5.1

Write the correct answer.

1. Name that wastes that is collected in the blow room machine.
2. Which factors are considered for waste reduction?



JOB SHEET 1			
Qualification:	Basic Techniques of Yarn Manufacturing		
Learning unit:	Operate blow room machine		
Learner name:			
Personal protective equipment (PPE):	Hand gloves, dust mask, ear plug, apron and goggles		
Materials:	Fibre		
Tools and equipment:	Blow room machine (Bale opening, Pre-cleaner, Fine cleaner, Condenser, Separator), measurement tape, wrench, hammer, pliers, screw driver.		
Performance criteria:	<ol style="list-style-type: none"> 1. Materials are identified according to job requirement. 2. Tools are identified and selected according to job requirement. 3. Fibres are laid down according to bale management. 4. Natural impurities and foreign materials are removed. 5. Machine is operated as per standard operating procedure. 6. Control points of blow room line are identified. 7. Waste materials are separated and disposed of as per standard operating procedure. 		
Measurement:			
Notes:	Mix and blend the fibres. Clean the fibres. Separate waste materials.		
Procedure:	<ol style="list-style-type: none"> 1. Open the fibres from the bale. 2. Blend and clean the fibres 3. Operate the machine. 4. Separate waste materials and dispose of. 		
Learner signature:		Date:	
Assessor signature:		Date:	
Quality Assurer signature:		Date:	
Assessor remarks:			



ANSWER KEYS

ANSWER KEY 2.1.1

1. Apron, dust mask, hand gloves, glasses and ear plug.
2. Ear plug is essential in the spinning factory, because so much noise is produced inside the factory. It may damage hearing power of the worker.

ANSWER KEY 2.1.2

- a. Following machines are used in the blow room line:

For Reiter	For Trutzschler	For conventional
Unifloc	BDT (Blendomart)	Automatic bale opener
Metal and fire detector	Electronic metal separator (SP-EM)	Automatic blender
Uniclean	Pre-cleaner (CL-P)	Step cleaner
Unimix	Universal Mixer (MX-U)	AXI Flow opener
Uniflex	Cleaner cleanomat (CL-C3)	Procupine opener
Loptex	Foreign parts separator (SP-FP)	Hopper feeder

- b. In this zone, basic function is to open the fibre tuft to smaller size and to clean the tuft removing big size of trash but smaller size of impurities which are trapped between fibres is not removed here. Gentle beating action but no picking is performed here.
- c. Foreign particles are metal parts, packing materials and short fibres of other fibres like polypropylene or polyester etc.

ANSWER KEY 2.1.3

1. Basic functions of blow room machine are opening, cleaning and mixing.
2. Opening is the first operation in the blow room carried out to the stage of fibres. In the stages of the opening, machines with an opening function have the task of separating clumps of fibre into smaller ones.

ANSWER KEY 2.2.1

1. Pre-cleaning section
2. Natural impurities
 - o Dry leaves
 - o Broken seeds
 - o Dead leaves

ANSWER KEY 2.3.1

1. Different types of foreign fibres are mixed with the fibres. As, polypropylene, polyethylene and feather. These foreign fibres are not dyed with the dyes used for cotton. So, these fibres are not dyed when cotton fibres are dyed and they look white. For this reason, foreign fibres separator is used.
2. Step cleaner is a conventional machine. Six beaters are used for cleaning fibres.
3. Multi-mixer is important as fibres are fed in the blow room from many bales and fibres have different properties. So, they are mixed together to get the uniform fibres in the yarns.
4. Different types of separators are used. They are:

- (i) Magnetic: Iron or metal parts are separated by the magnet.
- (ii) Electronic: Separation is done by electricity.

ANSWER KEY 2.4.1

1. **Blending:** When different types of fibres (it may be equal or nearly equal graded) are mixed together are within a particular ration then the mixture is known as blending.
Mixing: When same kind but different grades of fibers are mixed together then it is termed as mixing.
2. **Objects of Mixing and Blending in Spinning:** Various objects of mixing and blending have discussed in the following:
 - **Economy:** Blending and mixing influences the reduction of the final product through blend composition, availability of fibre quality, and inherent fibre variations.
 - **Processing performances:** It helps in processing of the below processes:
 - **Carding:** Mixing and blending influences the process performances of carding through control of nep level variation, waste level variation, fly, roving twist variation, machine adjustment and static electricity formation.

ANSWER KEY 2.5.1

Different types of waste materials are collected and separated in the blow room machine. They are:

1. Dropping-1
2. Dropping-2
3. Seeds
4. Leafs
5. Dust
6. Lap cut
7. Filter waste
8. Filter dust
9. Floor sweep

Wastage Reduction Procedure/ Factors for Wastage Reductions:

1. Raw materials selection
2. Spindle speed
3. Setting (Rollers, R/T, Traveller cleaner etc)
4. Twist of yarn
5. Machinery condition
6. RH% and temperature
7. Proper material handling
8. Adequate supervision

Module 3: Prepare materials for spinning



MODULE CONTENT

Module Descriptor: This module covers the knowledge, skills and attitudes to prepare materials for spinning. It specifically includes operating the machines, performing production of sliver and lap, cleaning the machine and disposing of waste material.

Nominal Duration: 56 hours



LEARNING OUTCOMES:

Upon completion of the module, the student/trainee will be able to:

- 3.1 Operate the machines
- 3.2 Perform production of silver and lap
- 3.3 Clean the machine
- 3.4 Dispose of waste material



PERFORMANCE CRITERIA:

1. Appropriate personal protective equipment (PPE) is identified and selected.
2. Hand tools are identified and selected as per job requirement.
3. Control points are identified.
4. The machines are operated as per standard operating procedure.
5. Materials are fed into the machines as per standard operating procedure.
6. Broken materials are pieced as per standard operating procedure.
7. Carded and drawn sliver, and mini laps are collected.
8. Carded and drawn sliver, and mini laps are doffed.
9. Machine parts are cleaned as per manufacturer instructions.
10. Cans and spools are cleaned as per standard operating procedure.
11. Waste material from machine is identified.



Learning Outcome 3.1 – Operate the Machine



Contents:

- Appropriate personal protective equipment
- Hand tools
- Control points of the machine
- The machines are operated as per standard operating procedure



Assessment criteria:

1. Appropriate personal protective equipment is identified and selected.
2. Hand tools are identified and selected as per job requirement.
3. Control points are identified.
4. Drafting zone.
5. The machine is operated as per standard operating procedure.



Resources required:

Students/trainees must be provided with the following resources:

- **Personal protective equipment (PPE):** safety cloth, hand gloves, dust mask, safety glasses, ear plugs
- **Tools and equipment:** Carding machine , Breaker draw frame, lap former, sample cutter, machine brush
- **Materials:** Chute or card mat, carded silver and drawn silver



LEARNING ACTIVITY 3.1.1

Learning Activity	Resources/Special Instructions/References
Operate carding machine	<ul style="list-style-type: none"> ▪ Information Sheets: 3.1.1 ▪ Self-Check Quiz: 3.1.1 ▪ Answer Key: 3.1.1 https://www.youtube.com/watch?v=nd6ExoC0LEY



INFORMATION SHEET 3.1.1

Learning Objective: to operate carding machine.

Carding Machine: Carding is a mechanical process that disentangles, cleans and intermixes fibres to produce a continuous web or sliver suitable for subsequent processing. The carding machine is located in the spinning process between the blow room and the drawing frame. It cleans and parallelizes the fibres. The resulting card web is then formed into a tape and placed into a can. The working elements are taken-in, main cylinder, card top and doffing cylinder. The working elements are equipped with saw-tooth wires.

Feeding system of carding machine: Two types of feeding system are used in the carding machine. They are:

1. Lap feeding: It is conventional feeding system. There is a lap stand and lap roller in the back or feed side of the carding machine. Lap is kept on the stand and feeding slowly and continuously as a sheet. This is known as lap feeding system.
2. Chute feeding: The system of feeding small tufts of cotton fibres directly from blow room to the card is called the chute feed system. It is a modern feeding system. Scutcher is the last section of blow room line machine and fibres are entered into the chute chamber by air blowing and these fibres made a layer or sheet of fibres as lap. These laps are feed into the carding machine. This system is known as chute feeding.

Importance of chute feeding:

1. Proper control of air pressure in the conveyor system for smooth flow of material.
2. A delivery system to feed the material to the card feed roller.
3. A sensing mechanism at chute to keep a certain amount of material as reserve and also to control the feed of material to the chute.

Chute feed system is also divided into two groups:

1. One-piece chute:
 1. No opening device is present in the one-piece chute system.
 2. Simple, economical and requires little maintenance.
 3. Closed system that is excess flock returns to the distributor.
 4. If too much material is present, neps can be increased.
 5. Not flexible to run different mixings.
2. Two-piece chute:
 1. With an opening system
 2. Complex, expensive but delivers a uniform batt.

Advantages of chute feed system:

1. Direct automatic feed to card.
2. Elimination of man power during scutcher operation.
3. Processing of rejected lap is avoided.
4. Due to loose from feeding of fibres trash particles can be removed easily during carding.
5. This is the only solution for higher production.

Disadvantages of chute feed system:

1. Blow room should run the same number of hours per week as the cards do.
2. The card production must be kept excessive to assure continuous feed to draw-frame at the time of stoppages at blow room due to maintenance and other unavoidable problems.

3. Chute feed system control short term variation but not the medium and long term variations.
4. A reliable check on the nominal count can be established in lap forming system by controlling total lap weight and C.V. value of the weight per unit length. There is no such control in the chute feeding system.
5. Change of mixing will result in more waste in chute feed.
6. Auto-leveller is must
7. Investment and maintenance cost are higher.

Important parts of chute feed:

- | | |
|---------------------------------|--------------------------------|
| 1. Control feed inlet | 8. Batt formation centre |
| 2. Dust extraction outlet | 9. Perforated sheet |
| 3. Pre-chute feed air discharge | 10. Air discharge outlet |
| 4. Chute feed chamber | 11. Feed roller |
| 5. Feed roller | 12. Pressure detection chamber |
| 6. Opening roller | 13. Control unit |
| 7. Feed table | 14. Fan. |

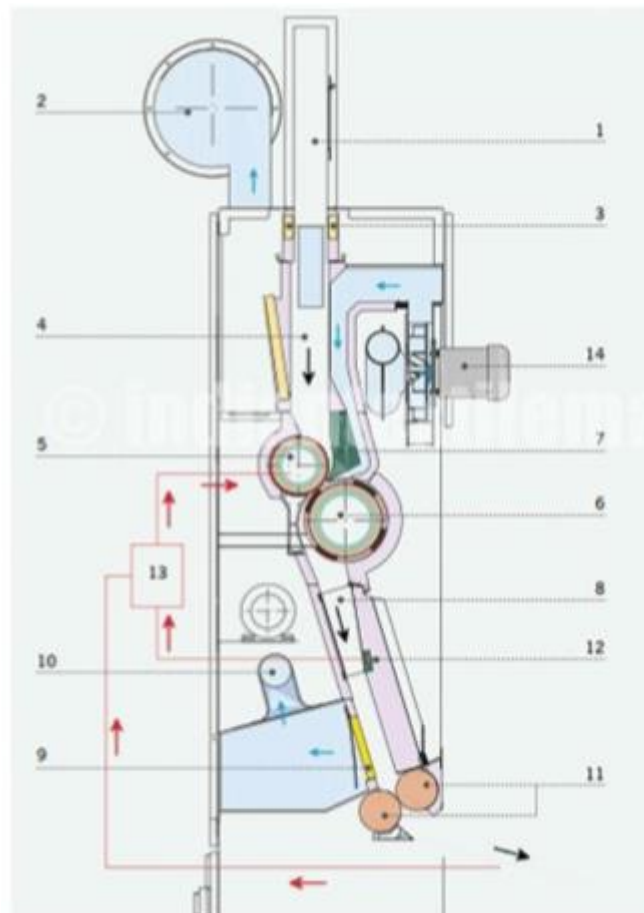


Fig: Chute feed system

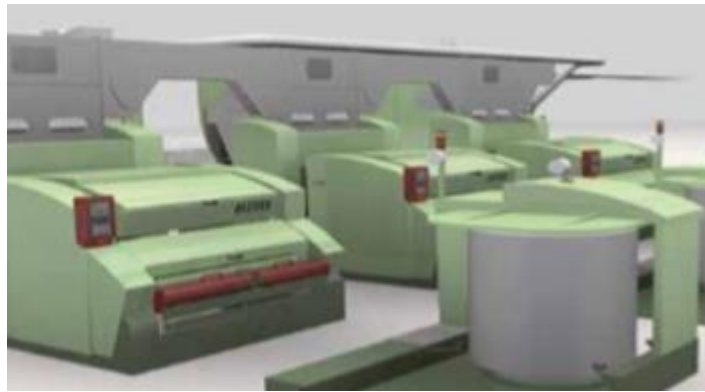
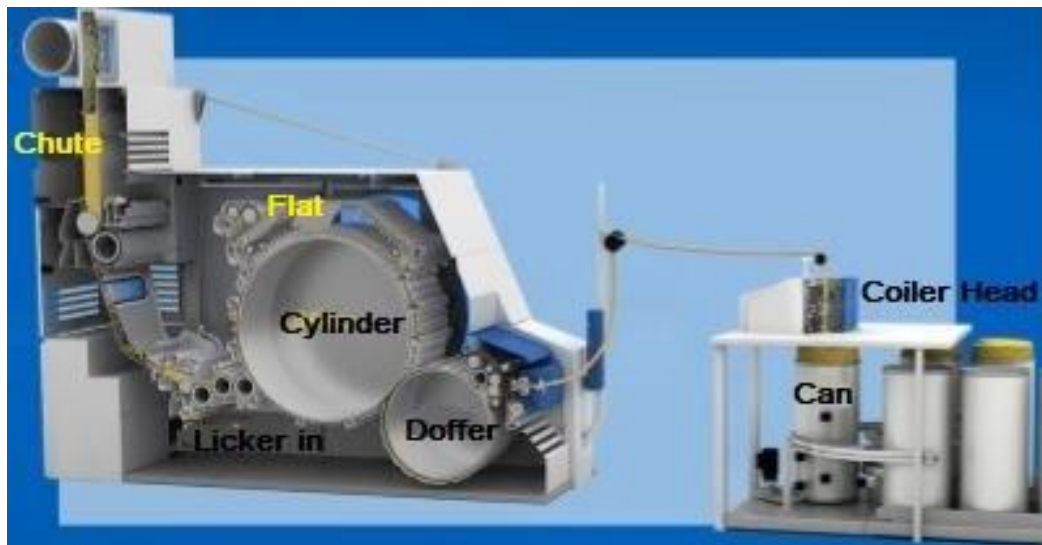


Fig: Reiter carding machine



Main parts of carding machine:

1. Chute feed
2. Feed roller
3. Licker-in/taker-in
4. Cylinder
5. Flat
6. Doffer
7. Calendar roller
8. Delivery roller
9. Coiler head

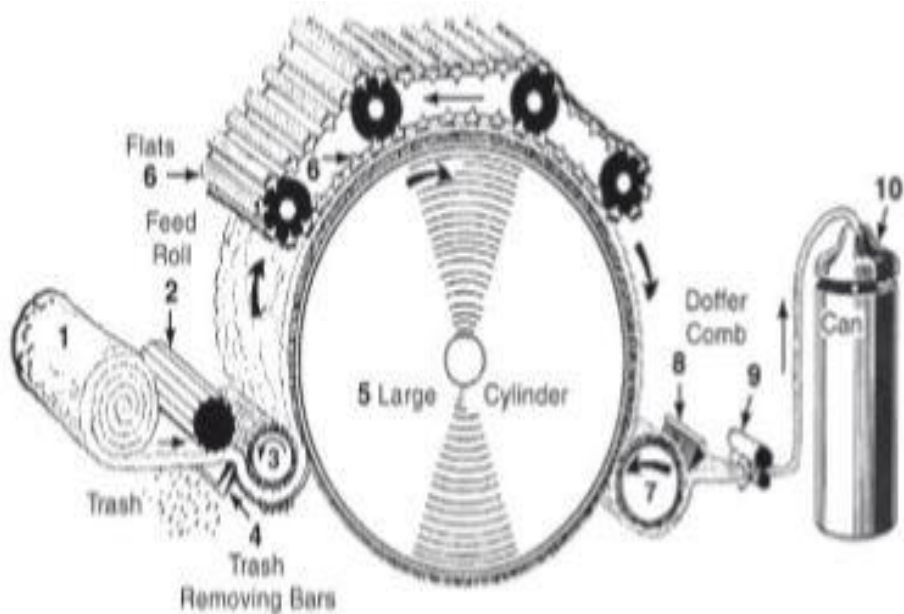
Types of carding machine

After carding machine was invented, it was upgraded many times. But carding machine of different types and models are being used from beginning.

Carding machines are being used from 1800 by following processes:

1. Roller and clearer card (Jute)
2. Static flat card (Cotton)
3. Rotating flat card (Cotton)

Besides for processing other fibres specially jute fibres, carding machine of different models are used. They are described in jute carding section.



The figure shows different parts of a rotating flat card. The arrows represent the roller's rotating directions.

Different types of wastages are found in the carding machine commonly known as dropping – I. For example:

1. Cylinder strip: Removed by cylinder strip.
2. Doffer strip: Removed by doffer strip.
3. Clearer waste: Collected from the middle of taker-in field and feed plate.
4. Sweeping waste: Collected by sweeping waste room floor.
5. Reusable waste: The card waste found if machine stops or sliver tears off.

Schedule maintenance of carding machine:

- Hang display on the machine one day before maintenance.
- Turn off the machine after asking the section officer.
- Check and clean different parts of the machine.
- If any part is not working, replace it with new parts.
- Clean the machine using air before starting again.



SELF-CHECK QUIZ 3.1.1

Write the correct answer.

1. Write the name of feeding system of carding machine.
2. Write down the name of main parts of carding machine.
3. What are the advantages of chute feed system?



LEARNING ACTIVITY 3.1.2

Learning Activity	Resources/Special Instructions/References
Operate breaker draw frame	<ul style="list-style-type: none">Information Sheet: 3.1.2Self-Check Quiz: 3.1.2Answer Key: 3.1.2 https://www.youtube.com/watch?v=CMEUG7QKHLM



INFORMATION SHEET 3.1.2

Learning Objective: to operate breaker draw frame machine.

Personal Protective Equipment (PPE): Gloves, dust mask, ear plug and apron.

1. Drawing: In the cotton industry the term is applied exclusively to processing on the draw frame, where the operation is one of doubling and drafting..
2. Doubling: The process of combing two or more carded sliver into a single form is called doubling.
3. Drafting: It is the process of increasing length per unit weight of sliver.



Fig: Breaker drawing frame

Description of draw frame machine and its functions

Some technical facts of drawing frame

1. Head number-2 (maybe 1)
2. Delivery head-1
3. Doubling-8:1
4. Drafting-8
5. Speed of delivery roller: 600-800 R.P.M
6. Diameter of delivery roller: 4.5



SELF-CHECK QUIZ 3.1.2

Write the correct answer.

1. What is the function of draw-frame?
2. What is the doubling of draw-frame?
3. What is the speed of draw-frame?



LEARNING ACTIVITY 3.1.3

Learning Activity	Resources/Special Instructions/References
Operate lap former machine	<ul style="list-style-type: none">▪ Information Sheets: 3.1.3▪ Self-Check Quiz: 3.1.3▪ Answer Key: 3.1.3 <p>https://www.youtube.com/watch?v=RzzhBpx4x3w</p>



INFORMATION SHEET 3.1.3

Learning Objective: to operate lap former machine.

Lap former

The lap former has, furthermore, the task of forming the interfacing or lap, which is employed to feed the combing machine. The lap is obtained by doubling a certain number of slivers (from 16 to 32) previously subject to a drawing passage. The slivers are fed side by side, passing, through rollers and stop motion. The slivers enter the drafting section and then calendar ' section to produce a compact lap. Finally the lap is wound on to bobbin. In the lap former, the material under goes a light draft of around 1.5 to 2 times one a drawing aggregate of the type 2 on top of 3 cylinders.



Fig: Lap former

Different machines used to create lap:

- Sliver lap machine
- Ribbon lap machine
- Super lap former

Sliver lap machine

Lap is created from carding or drawing sliver. Ribbon lap machine is required for doubling after sliver lap is created. Carding machine is used directly in this machine.

Objective of sliver lap machine

- Lap is formed from many slivers arranged side by side by doubling.
- Fibres are made straight and parallel by drafting.
- Fibres are to be made soft so that needle of combing can enter easily.
- Remove inequality of carded liver as much as possible.
- Lap's unit length weight should be reduced.



Fig: Ribbon lap machine

Super lap former

Generally super lap is formed using drawing sliver to use them in modern process or high yielding combing machine. In this process super lap is formed by not changing the properties found from normal lap machine and ribbon lap machine.

Objective of super lap former

1. Uniform lap is created.
2. As drawing sliver is used, fibre remains straight and parallel.
3. Lap is produced by excess drafting and doubling.
4. Super lap is also usable in combing machine like ribbon lap.



Fig: Super lap former



SELF-CHECK QUIZ 3.1.3

Write the correct answer.

1. What is the function of lap former machine?
2. What is the doubling of lap former?



Learning Outcome 3.2 – Perform Production of Sliver and Lap



Contents:

- Process of materials feeding into the machines:
 - Chute or card mat
 - Carded sliver
 - Drawn sliver
- Piecing of broken materials
- Collection of carded and drawn sliver and mini laps
- Doffing of carded and drawn sliver and mini laps.



Assessment criteria:

1. Materials are fed into the machines as per standard operating procedure.
2. Broken materials are pieced as per standard operating procedure.
3. Carded and drawn sliver, and mini laps are collected.
4. Carded and drawn sliver, and mini laps are doffed.



Resources required:

Students/trainees must be provided with the following resources:

- **Personal protective equipment (PPE):** safety cloth, hand gloves, dust mask, safety glasses
- **Tools and equipment: Materials:** Carding machine, Breaker draw frame, lap former, sample cutter, machine brush
- **Materials:** Chute or card mat, carded sliver and drawn sliver



LEARNING ACTIVITY 3.2.1

Learning Activity	Resources/Special Instructions/References
Perform production of sliver and lap	<ul style="list-style-type: none"> ▪ Information Sheet: 3.2.1 ▪ Self-Check Quiz: 3.2.1 ▪ Answer Key: 3.2.1



INFORMATION SHEET 3.2.1

Learning Objective: to perform production of sliver and lap.

Chute or card mat produced in the blow room section are fed into the carding machine. These mat is fed by feed roller above the feed plate. Then lap sheet pass through taker-in, large cylinder, doffer, calendar roller and delivery roller. Carded sliver produced in the carded machine.

Carded sliver produced in the carding machine fed into the breaker draw frame machine. The carded sliver pass through feed rollers and delivery rollers. Drawing, doubling and drafting is done in this machine. Finally drawn sliver is produced.

Drawn sliver is fed into the lap former machine. For producing combed yarn, this lap former machine is used. Maximum 32 sliver can be fed in this machine. Weight of mini lap may be 25 kg. It takes two to three minutes to produce one mini lap.



SELF-CHECK QUIZ 3.2.1

Check your understanding by answering the following questions:

1. What is fed into the carding machine?
2. How many drawn slivers are fed into the lap former machine?



Learning Outcome 3.3 – Clean the machine



Contents:

- Cleaning of machine parts
- Cleaning of cans and spools



Assessment criteria:

1. Machine parts are cleaned as per manufacturer instructions.
2. Cans and spools are cleaned as per standard operating procedure.



Resources required:

Students/trainees must be provided with the following resources:

- **Personal protective equipment (PPE):** safety cloth, hand gloves, dust mask, safety glasses
- **Tools and equipment:** Carding machine, Breaker draw frame, lap former, sample cutter, machine brush
- **Materials:** Chute or card mat, carded sliver and drawn sliver



LEARNING ACTIVITY 3.3.1

Learning Activity	Resources/Special Instructions/References
Clean the machine (carding machine, breaker draw frame, lap former)	<ul style="list-style-type: none"> ▪ Information Sheet: 3.3.1



INFORMATION SHEET 3.3.1

Learning Objective: to clean the machine (carding machine, breaker draw frame and lap former).

There are different types of feed roller, taker-in, cylinder, doffer, calendar roller, delivery roller and drafting zone. These machine parts are needed to be cleaned. As materials pass between rollers, so these zones may be blocked with small loose fibres and they may block filters. It is important to clean the machine parts for smooth running of the machine.

Sliver cans are also needed to be cleaned. As, many times, materials left in the packages which may contaminate the combed sliver. Sometimes, sliver becomes faulty because of mixing of left over slivers of the can.



Learning Outcome 3.4 – Dispose of Waste Materials



Contents:

- Waste materials of carding machine, breaker draw frame and lap former machine
- Process of disposal of waste materials



Assessment criteria:

1. Waste materials from machine is identified, separated and disposed of as per standard operating procedure.



Resources required:

Students/trainees must be provided with the following resources:

- **Personal protective equipment (PPE):** safety cloth, hand gloves, dust mask, safety glasses and ear plugs
- **Tools and equipment:** Carding machine, Breaker draw frame, lap former, sample cutter, machine brush
- **Materials:** Chute or card mat, carded sliver and drawn sliver



LEARNING ACTIVITY 3.4

Learning Activity	Resources/Special Instructions/References
Dispose of waste materials	<ul style="list-style-type: none"> ▪ Information Sheet: 3.4.1 ▪ Self-Check Quiz: 3.4.1 ▪ Job Sheet 2 ▪ Answer Key: 3.4.1



INFORMATION SHEET 3.4.1

Learning Objective: to disposal of waste materials of carding machine, breaker draw frame and lap former machine.

Wastage of carding machine: Many types of waste materials are found during production. There are some wastages of carding machine.

1. Flat strip
2. Taker in waste
3. Sliver cut
4. Filter waste
5. Filter dust
6. Floor sweep

Wastage of breaker draw frame machine: there are also some waste materials produced during production.

1. Filter waste
2. Bonda
3. Sliver cut



SELF-CHECK QUIZ 3.4.1

Check your understanding by answering the following questions:

1. What are the wastages of carding machine?
2. Write the name of some waste materials of breaker draw frame machine?



JOB SHEET 2			
Qualification:	Basic Techniques of Yarn Manufacturing		
Learning unit:	Operate carding machine, Breaker drawing frame and lap former		
Learner name:			
Personal protective equipment (PPE):	Hand gloves, dust mask, ear plug, apron and goggles.		
Materials:	Chute mat, carded sliver and breaker drawn sliver		
Tools and equipment:	Carding machine, Breaker drawing frame and lap former		
Performance criteria:	<ol style="list-style-type: none"> 1. Appropriate personal protective equipment is identified and selected. 2. Hand tools are identified and selected as per job requirement. 3. Control points are identified. 4. The machines (carding machine, breaker draw frame and lap former) are operated as per standard operating procedure. 5. Materials are fed into the machines as per standard operating operation. 6. Broken materials are pieced as per standard operating procedure. 7. Waste materials are separated and disposed of as per standard operating procedure. 		
Measurement:	Maintain the speed of the machine Maintain the quality of the product		
Notes:	Clean the drafting zone when required.		
Procedure:	<ol style="list-style-type: none"> 1. Collect the chute mat from bale opening machine. 2. Feed the materials into the machine. 3. Operate the machine. 4. Separate waste materials and dispose of. 		
Learner signature:		Date:	
Assessor signature:		Date:	
Quality Assurer signature:		Date:	
Assessor remarks:			



ANSWER KEYS

ANSWER KEY 3.1.1

1. Two types of feeding system are used in the carding machine. They are:
 1. Lap feeding
 2. Chute feeding
2. Main parts of carding machine:
 1. Chute feed
 2. Feed roller
 3. Licker-in/taker-in
 4. Cylinder
 5. Flat
 6. Doffer
 7. Calendar roller
 8. Delivery roller
 9. Coiler head
3. Advantages of chute feed system:
 1. Direct automatic feed to card.
 2. Elimination of man power during scutcher operation.
 3. Processing of rejected lap is avoided.
 4. Due to loose from feeding of fibres trash particles can be removed easily during carding.
 5. This is the only solution for higher production.

ANSWER KEY 3.1.2

1. Doubling and drafting is the main function of draw frame.
2. The process of combining two or more carded sliver into a single form is called doubling.
3. 600 to 800 rpm.

ANSWER KEY 3.1.3

1. The function of lap former machine is to make the fibres straighter and more parallel in the sliver and make lap from many slivers.
2. Lap is formed in the lap former from 6 to 8 slivers.

ANSWER KEY 3.2.1

1. Chute or card mat produced in the blow room section are fed into the carding machine.
2. 32 slivers can be fed into the lap former machine.

ANSWER KEY 3.4.1

1. Wastage of carding machine: Many types of waste materials are found during production:
 1. Flat strip
 2. Taker in waste
 3. Sliver cut
 4. Filter waste
 5. Filter dust
 6. Floor sweep
2. Wastage of breaker draw frame machine: there are also some waste materials produced during production:
 1. Filter waste
 2. Bonda

3. Sliver cut

Module 4: Perform spinning operation



MODULE CONTENT

Module Descriptor: This module covers the knowledge, skills and attitudes to perform spinning operation. It specifically includes handling lap trolley, operating the machine (comber and finisher draw frame), perform feeding of materials and piecing, cleaning the machine and disposing of waste material.

Nominal Duration: 56 hours



LEARNING OUTCOMES:

Upon completion of the module, the student/trainee should be able to:

- 4.1 Handle lap trolley
- 4.2 Operate the machine
- 4.3 Perform feeding of materials and piecing
- 4.4 Clean the machine, cans and spools
- 4.5 Dispose of waste material



PERFORMANCE CRITERIA:

1. Lap trolley of full and empty packages is collected as per schedule.
2. Trolley wheels are cleaned as per schedule.
3. Appropriate personal protective equipment (PPE) is identified and selected
4. Hand tools are identified and selected as per job requirement.
5. Control points are identified.
6. The machines are operated as per standard operating procedure.
7. Materials are fed into the machine as per standard operating procedure.
8. Broken materials are pieced as per standard operating procedure.
9. Machine parts are cleaned as per manufacturer instructions.
10. Cans and spools are cleaned as per standard operating procedure.
11. Waste material from machine is identified.
12. Waste material is separated and disposed of as per standard operating procedure.



Learning Outcome 4.1 - Handle Lap Trolley



Contents:

- Lap trolley handling



Assessment criteria:

1. Tools and equipment are gathered, checked and prepared in accordance with job requirements.
2. Lap trolley of full and empty packages is collected as per schedule.
3. Trolley wheels are cleaned as per schedule.



Resources required:

Students/trainees must be provided with the following resources:

- **Personal protective equipment (PPE):** safety cloth, hand gloves, dust mask, safety glasses, ear plugs
- **Tools and equipment:** Comber machine, finisher draw frame, adjustable wrench, screw driver, hammer, pliers
- **Materials:** Mini lap and combed sliver



LEARNING ACTIVITY 4.1.1

Learning Activity	Resources/Special Instructions/References
Handle lap trolley	<ul style="list-style-type: none"> ▪ Information Sheet: 4.1.1 ▪ Self-Check Quiz: 4.1.1 ▪ Answer Key: 4.1.1



INFORMATION SHEET 4.1.1

Learning Objective: to handle lap trollies used in the comber machine.

Lap is produced in the lap former machine and these laps are fed in the comber machine. Normally eight laps are fed into the comber machine at a time. The laps are generally transported to the combers manually, i.e. by carrying one or two laps on hands at a time. This system takes a lot of time and also

results in wastage of material. The trolley can transport 8 laps at a time. It can be moved easily and operators can manage them easily. They have to be careful about mixing of laps of different types of fibres and feeding of correct laps to the correct place.



SELF-CHECK QUIZ 4.1.1

Write the appropriate answer.

1. How is lap transported to the comber machine?
2. How many laps are fed into the comber machine at a time?



Learning Outcome 4.2 - Operate the Machine



Contents:

- Personal protective equipment (PPE)
- Control points
- Machine operation



Assessment criteria:

1. Appropriate personal protective equipment (PPE) is identified and selected as required.
2. Hand tools are identified and selected as per job requirement.
3. Control points are identified.
4. The machines are operated as per standard operating procedure.



Resources required:

Students/trainees must be provided with the following resources:

- **Personal protective equipment (PPE):** safety cloth, hand gloves, dust mask, safety glasses, ear plugs
- **Tools and equipment:** Comber machine, finisher draw frame, adjustable wrench, screw driver, hammer, pliers
- **Materials:** Mini lap and combed sliver



LEARNING ACTIVITY 4.2.1

Learning Activity	Resources/Special Instructions/References
Operate combing machine	<ul style="list-style-type: none"> ▪ Information Sheet: 4.2.1 ▪ Self-Check Quiz: 4.2.1 ▪ Answer Key: 4.2.1 https://www.youtube.com/watch?v=bZbiB0Vn1H4



INFORMATION SHEET 4.2.1

Learning Objective: to operate combing machine.

Combing machine:

The Comber removes short fibres that are not good in making fine yarns and a brush cleans the comber and the suction device takes out the short fibres. As soon as combing is complete the sheet of web comes over a plate and gets condensed to form a sliver, the pre and post broken sheet of web are joined by a forward and backward moving pair of fluted rollers at the bottom and rubber covered rollers at the top which grip the sheet of fine web which looks like a bridal veil. 8 such Comber segments from one machine and even 16 segments may form a machine known as a double-sided machine.

Different parts of combing machine:

- 1) Feed roller
- 2) Feed plate
- 3) Top nipper
- 4) Bottom nipper
- 5) Cylinder comb
- 6) Top comb
- 7) Brush
- 8) Detaching roller
- 9) Calendar roller
- 10) Trumpet or condenser
- 11) Drafting zone
- 12) Coiler head

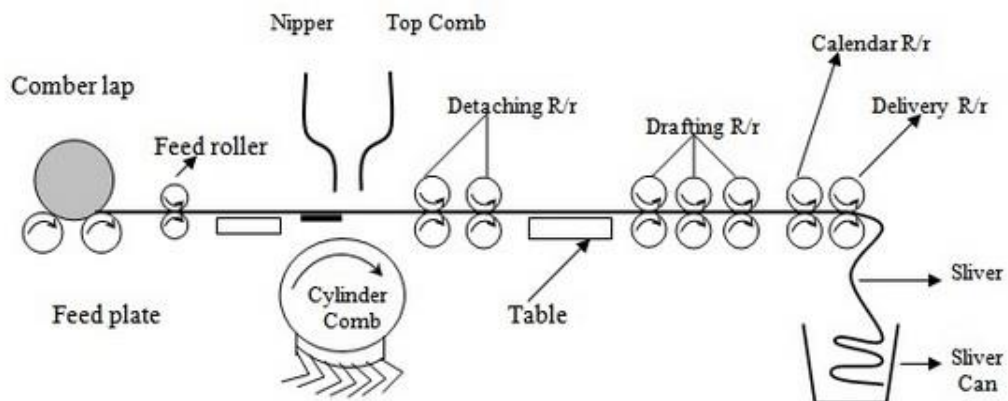


Fig: Different parts of a combing machine

The works a operator does on a combing machine:

- 1) The surroundings of the machine should be kept clean.
- 2) Machine cannot be stopped.
- 3) Lap former should be kept beside machine before lap ends.



Fig: Combing machine

Combing machine is divided into following parts:

- 1) Creel or feed zone
- 2) Combing zone
- 3) Delivery zone
- 4) Doubling zone
- 5) Drafting zone

Creel or feed zone

This zone contains sliver lap that get fed into the machine slowly. Creel zone contains following zones:

- Lap roller
- Feed roller
- Feed plate

Lap Roller

Lap roller is placed on lap which feeds the lap slowly. This is made of wood and it contains slots.

Feed Roller

Feed roller inside the main machine helps in lap feeding. Feed roller is situated on the feed plate.

Nipper plate

Nipper and feed plate help to hold the laps together.

Combing zone

Main combing is done in this zone. Combing zone contains following equipment:

- Cylinder
- Top comb

Cylinder

Cylinder is the main part of combing machine. One-third of it contains needles. Needles remove small fibres and dirt from lap.

Top comb

Top comb is suspended by one row needles. It combs the upper part of the lap periodically and removes soil.

Delivery zone

This zone delivers combed big fibres as sliver. This zone contains following equipment:

- Detaching or attaching roller
- Delivery roller
- Delivery plate

Detaching or attaching roller

Detaching roller delivers fibre by attaching them from both sides.

Delivery roller

Delivered fibres from detaching roller are taken to sliver doubling plate.

Delivery plate

This plate takes the slivers forward.

Doubling zone

3 or 4 slivers in doubling zone are doubled.

Drafting zone

Per unit lengths weight is reduced and produced sliver is deposited in sliver can in drafting zone.

**SELF-CHECK QUIZ 4.2.1**

Write the correct answer to the following.

1. State the functions of a comber machine.
2. Write down the names of different parts of comber machine.



Learning Outcome 4.3 - Perform Feeding of Materials and Piecing



Contents:

- Process of materials feeding into the machine
- Process of piecing of broken materials



Assessment criteria

1. Materials are fed into the machine as per standard operating procedure.
2. Broken materials are pieced as per standard operating procedure.



Resources required:

Students/trainees must be provided with the following resources:

- **Personal protective equipment (PPE):** helmet, safety shoes, safety cloth/apron, hand gloves, dust mask, safety glasses, ear plugs/ear muffs
- **Tools and equipment:** Comber machine, finisher draw frame, adjustable wrench, screw driver, hammer, pliers
- **Materials:** Mini lap and combed sliver



LEARNING ACTIVITY 4.3.1

Learning Activity	Resources/Special Instructions/References
Perform feeding of materials and piecing	<ul style="list-style-type: none"> ▪ Information Sheet: 4.2.1 ▪ Self-Check Quiz: 4.2.1 ▪ Answer Key: 4.2.1



INFORMATION SHEET 4.3.1

Learning Objective: to perform feeding of materials and piecing.

At first lap is fed by lap roller. Then lap is passed through the condenser. Material is passed under the feed roller and through the nipper. Here top and bottom nippers are used to nip the lap. Then lap is passed through the detaching roller. Here a cloth clearer is used to clean the lap. Then it passes through the

condenser and calendar roller. Then it enters into the drafting zone by the feed table. Then the drafted material is passed by the help of belt into trumpet. Finally it is deposited into can by passing through coiler calendar roller and coiler head.

Piecing is the joining of two ends. When any break occurs or if required for continuous feeding, piecing is done.



SELF-CHECK QUIZ 4.3.1

Write the appropriate answer.

1. Describe the material passage of combing machine.



Learning Outcome 4.4 - Clean the Machine, Cans and Spools



Contents:

- Cleaning of machine parts as per manufacturer instructions
- Cleaning of cans and spools



Assessment criteria:

1. Machine parts are cleaned as per manufacturer instructions.
2. Cans and spools are cleaned as per standard operating procedure.



Resources required:

Students/trainees must be provided with the following resources:

- **Personal protective equipment (PPE):** safety cloth, hand gloves, dust mask, safety glasses
- **Tools and equipment:** Comber machine, finisher draw frame, adjustable wrench, screw driver, hammer, pliers
- **Materials:** Mini lap and combed sliver



LEARNING ACTIVITY 4.4.1

Learning Activity	Resources/Special Instructions/References
Clean the machine and can	<ul style="list-style-type: none"> ▪ Information Sheet: 4.4.1 ▪ Self-Check Quiz: 4.4.1 ▪ Answer Key: 4.4.1



INFORMATION SHEET 4.4.1

Learning Objective: to clean the machine and can.

There are different types of feed roller, top and bottom nipper, cylinder and top comb, detouching roller, brush and drafting zone. These machine parts are needed to be cleaned. As materials pass between rollers,

so these zones may be blocked with small loose fibres called noils. It is important to clean the machine parts for smooth running of the machine.

Sliver cans are also needed to be cleaned. As, many times, materials left in the packages which may contaminate the combed sliver. Sometimes, sliver becomes faulty because of mixing of left over slivers of the can.



SELF-CHECK QUIZ 4.4.1

Check your understanding by answering the following question:

1. Why do sliver cans need to be cleaned?



Learning Outcome 4.5 – Dispose of Waste Materials



Contents:

- Waste material of comber machine.
- Separation and disposal of waste material



Assessment criteria:

1. Waste material from machine is identified, separated and disposed of as per standard operating procedure.



Resources required:

Students/trainees must be provided with the following resources:

- **Personal protective equipment (PPE):** safety cloth, hand gloves, dust mask, safety glasses
- **Tools and equipment:** Comber machine, finisher draw frame, adjustable wrench, screw driver, hammer, pliers
- **Materials:** Mini lap and combed sliver



LEARNING ACTIVITY 4.5.1

Learning Activity	Resources/Special Instructions/References
Dispose of waste materials	<ul style="list-style-type: none"> ▪ Information Sheet: 4.5.1 ▪ Self-Check Quiz: 4.5.1 ▪ Job Sheet 3 ▪ Answer Key: 4.5.1



INFORMATION SHEET 4.5.1

Learning Objective: to dispose of waste materials of comber and finisher draw frame machine.

Wastage in Combing:

1. Noil: As per desired & quality of the end product to be produced.
2. Minilap Wastage: 0.25%
3. Sliver Wastage : 0.25%

4. Roller Wastage : 0.25%
5. Fly Dust: 0.10%
6. Sweeping: 0.20%

Draw Frame wastages:

1. Filter waste
2. Bonda
3. Sliver cut



SELF-CHECK QUIZ 4.5.1

Check your understanding by answering the following questions:

1. What is the name of waste from a combing machine?
2. Write the name of finisher draw frame wastages.



JOB SHEET 3			
Qualification:	Basic Techniques of Yarn Manufacturing		
Learning unit:	Operate Comber and finisher draw frame machine		
Learner name:			
Personal protective equipment (PPE):	Hand gloves, dust mask, ear plug, apron and goggles.		
Materials:	Breaker drawn sliver and combed sliver		
Tools and equipment:	Comber and finisher draw frame machine		
Performance criteria:	<ol style="list-style-type: none"> 1. Lap trolley of full and empty packages is collected as per schedule. 2. Trolley wheels are cleaned as per schedule. 3. Appropriate personal protective equipment is identified and selected. 4. Hand tools are identified and selected as per job requirement. 5. Control points are identified. 6. The machines are operated as per standard operating procedure. 7. Materials are fed into the machine as per standard operating procedure. 8. Broken materials are pieced as per standard operating procedure. 9. Machine parts are cleaned as per manufacturer instructions. 10. Cans and spools are cleaned as per standard operating procedure. 11. Waste material from machine is identified. 12. Waste material is separated and disposed of as per standard operating procedure. 		
Measurement:	Maintain the drafting zone of combing machine		
Notes:	Clean the drafting zone when required.		
Procedure:	<ol style="list-style-type: none"> 1. Collect the breaker drawn sliver from breaker draw frame machine. 2. Feed the materials into the combing machine. 3. Operate the Combing machine. 4. Collect combed sliver from combing machine. 5. Feed the materials into the finisher draw frame machine. 6. Operate the finisher draw frame machine. 7. Separate waste materials and dispose of. 		
Learner signature:		Date:	
Assessor signature:		Date:	
Quality Assurer signature:		Date:	

Assessor remarks:	
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ANSWER KEYS

ANSWER KEY 4.1.1

1. Lap is transported to the comber machine with the help of trolley.
2. Normally eight laps are fed to the comber machine at a time.

ANSWER KEY 4.2.1

1. The Comber removes short fibres that are not good in making fine yarns and a brush cleans the comber and the suction device takes out the short fibres.
2. Different parts of combing machine:
 - a. Feed Roller
 - b. Feed plate
 - c. Top nipper
 - d. Bottom nipper
 - e. Cylinder comb
 - f. Top comb
 - g. Brush
 - h. Detaching roller
 - i. Calendar roller
 - j. Trumpet or condenser
 - k. Drafting zone
 - l. Coiler head

ANSWER KEY 4.3.1

At first lap is fed by lap roller. Then lap is passed through the condenser. Material is passed under the feed roller and through the nipper. Here top and bottom nippers are used to nip the lap. Then lap is passed through the detaching roller. Here a cloth clearer is used to clean the lap. Then it passes through the condenser and calendar roller. Then it enters into the drafting zone by the feed table. Then the drafted material is passed by the help of belt into trumpet. Finally, it is deposited into can by passing through coiler calendar roller and coiler head.

ANSWER KEY 4.4.1

Sliver cans are also needed to be cleaned. As, many times, materials left in the packages which may contaminate the combed sliver. Sometimes, sliver becomes faulty because of mixing of left-over slivers of the can

ANSWER KEY 4.5.1

1. Wastage in Combing:
 - a. Noil: As per desired & quality of the end product to be produced.
 - b. Minilap Wastage: 0.25%
 - c. Sliver Wastage : 0.25%
 - d. Roller Wastage : 0.25%
 - e. Fly Dust: 0.10%
 - f. Sweeping: 0.20%
2. Draw Frame wastages:
 - a. Filter waste
 - b. Bonda
 - c. Sliver cut

Module 5: Perform Spinning and Finishing



MODULE CONTENT

Module Descriptor: This module covers the knowledge, skills and attitudes to perform spinning and finishing. It specifically includes operating machines, performing feeding, creeling and piecing of materials, carrying out doffing operation, cleaning the machines and packages and disposing of waste material.

Nominal Duration: 64 hours



LEARNING OUTCOMES:

Upon completion of the module, the student/trainee will be able to:

- 5.1 Operate the machine
- 5.2 Perform feeding, creeling and piecing
- 5.3 Perform doffing operation
- 5.4 Clean the machines and packages
- 5.5 Dispose of waste materials



PERFORMANCE CRITERIA:

1. Appropriate personal protective equipment (PPE) is identified and selected.
2. Hand tools are identified and selected as per job requirement.
3. Control points are identified.
4. The machines are operated as per standard operating procedure.
5. Block of materials are identified and separated.
6. Materials are identified and arranged.
7. Materials are fed into the machines as per standard operating procedure.
8. Broken materials are pieced to continue production.
9. Roving and yarns are collected.
10. Full and empty packages are arranged as required.
11. Machine parts are cleaned as per manufacturer instruction.
12. Packages are cleaned as per standard operating procedure.
13. Waste materials from machine is identified.
14. Waste materials are separated and disposed of as per standard operating procedure.



Learning Outcome 5.1 – Operate the Machine



Contents:

- Control points
- Machines
- Block of materials
- Materials
- Packages
- Machine parts



Assessment criteria:

1. Appropriate personal protective equipment (PPE) are used and demonstrated according to job requirements.
2. Quantity and quality of tools and equipment identified and gathered according to work requirements.
3. Control points are identified.
4. The machines are operated as per standard operating procedure.
5. Block of materials are identified and separated.
6. Materials and packages are identified and arranged as required.
7. Machine parts are cleaned as required.



Resources required:

Students/trainees must be provided with the following resources:

- **Personal protective equipment (PPE):** safety shoes, safety cloth, hand gloves, dust mask, safety glasses and ear plugs
- **Tools and equipment:** Simplex/speed frame, ring frame, rotor spinning, auto coner machine
- **Materials:** sliver, roving and yarn



LEARNING ACTIVITY 5.1.1

Learning Activity	Resources/Special Instructions/References
Operate simplex machine	<ul style="list-style-type: none"> ▪ Information Sheet: 5.1.1 ▪ Self-Check Quiz: 5.1.1



INFORMATION SHEET 5.1.1

Learning Objective: to operate simplex machine.

Simplex machine

Simplex Machine for spinning process is an industrial machinery used for spinning process of Textile technology to transform the drawn sliver into roving. The main function of simplex machine is the attenuation of drawn sliver and insert small amount of twist to give required strength of roving. Finally, the twisted roving is wound on to bobbin. Simplex machine is used to the carded and combed yarn process but for the rotor spinning system this process can be eliminated.

An operator of simplex machine does the following things:

- 1) Empty bobbin must be cleaned well and hanged properly.
- 2) Machine should be started after keeping the doffer down.
- 3) Machines creel, drafting zone, suction box and floor must be kept clean.
- 4) Torn sliver can't be thrown in can or floor.
- 5) Can's wheel should be kept clean.



Fig: Simplex machine

Description of simplex machine

Simplex machine contains the following parts:

- 1) Creel zone
- 2) Drafting zone
- 3) Delivery zone
- 4) Spindle driving mechanism
- 5) Bobbin driving mechanism
- 6) Head stock and tail stock
- 7) Others

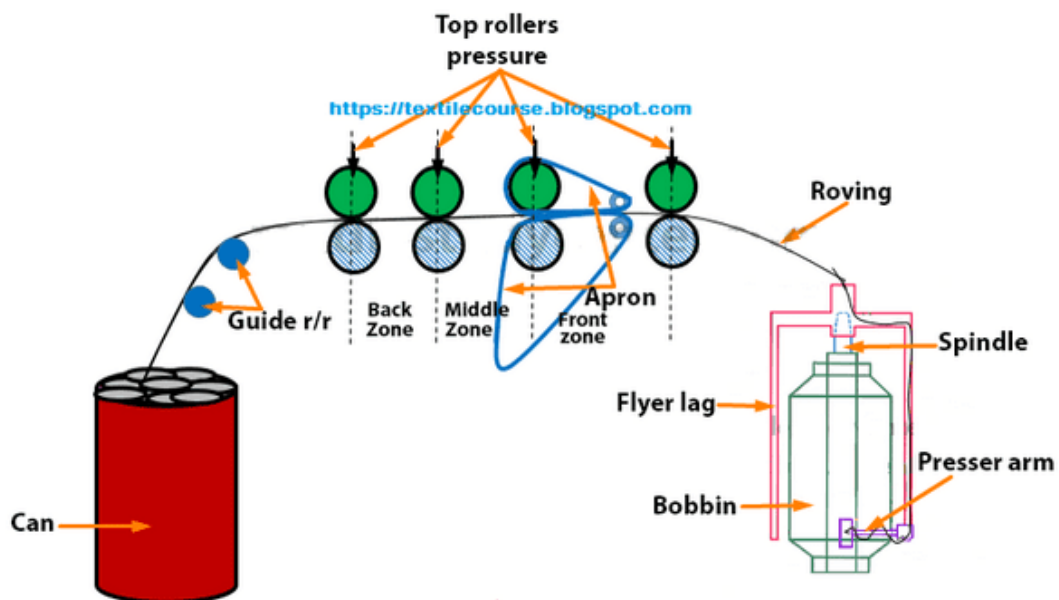


Fig: Different parts of simplex machine

Creeling

Creeling is the first objective of simplex frame arrangement. By creeling, small amount of draft is applied to the drawn sliver.

Drafting

Attenuation of drawn sliver to produce required amount of roving by drafting. Thick drawn sliver is converted into thin roving by drafting system.

Delivery zone

In this zone bobbin and flyer are present to pass roving forward. This is called spindle. Generally, one frame contains 2 rows spindle and each spindle contains one flyer.

Spindle driving mechanism

To rotate the spindle, driving mechanism is kept under the machine near the floor. This mechanism doesn't move with the spindle.

Bobbin driving mechanism

Bobbin is situated on robin rail which covers the entire length of the machine. The mechanism moves up and down.

Head stock and tail stock

Head stock is situated at one side of the machine and tail stock on the other side. The head stock also called the gearing end. This end contains the gears of the machine inside a box. The tail only contains the machine frame inside which the bearing box is found.

Others

Besides above parts, the simplex machine contains clearer, cone drum, building motion etc.



SELF-CHECK QUIZ 5.1.1

Check your understanding by answering the following questions:

1. What are the functions of a simplex machine?
2. Write down the name of the parts of simplex machine.



LEARNING ACTIVITY 5.1.2

Learning Activity	Resources/Special Instructions/References
Operate ring frame machine	<ul style="list-style-type: none">▪ Information Sheets: 5.1.2▪ Self-Check Quiz: 5.1.2▪ Answer Key: 5.1.2



INFORMATION SHEET 5.1.2

Learning Objective: to operate ring frame machine.

Ring frame

Ring Spinning is the oldest of the present day spinning processes. The fibre material is supplied to the ring-spinning machine in the form of roving. The fibre mass of the roving is reduced by a drafting unit. The twist inserted moves backwards and reaches the fibers leaving the drafting unit.

The fibres lay around one another in concentric helical paths. The normal forces encountered by the fibers enhance the adhesive forces between the fibers and prevent fibres from flying or slipping past each other under the tensile strain.



Fig: Ring frame

Objective of ring frame

- 1) To create yarn of certain count by drafting process by roving.
- 2) To make yarn stronger by twisting.
- 3) To wind yarn in definite ring cop.

Operations of ring frame

- 1) Creeling
- 2) Drafting
- 3) Twisting
- 4) Winding
- 5) Building
- 6) Doffing



Fig: Creeling

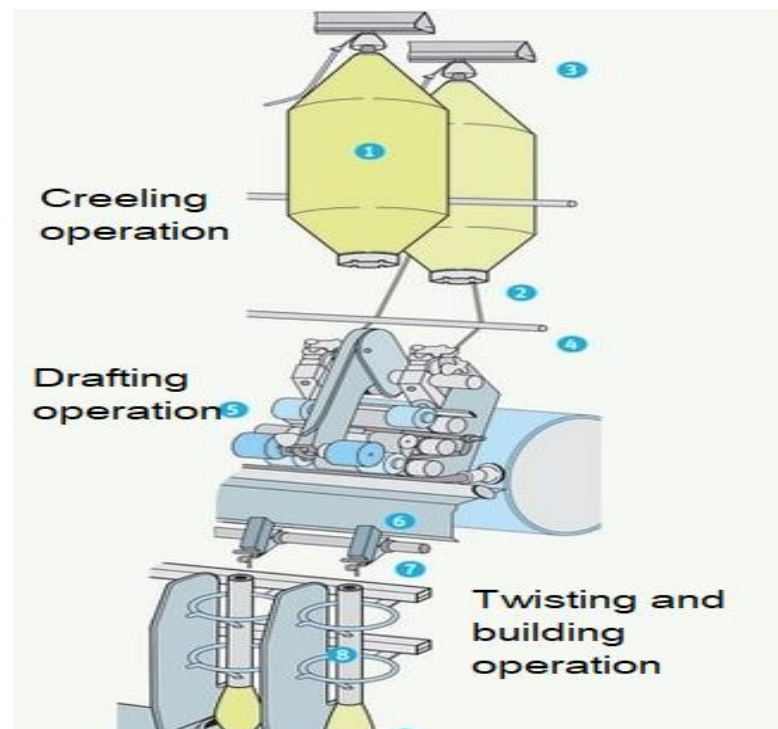


Fig: Operations of ring frame machine

Advantage of Ring Spinning System:

1. Any type of material (fibre) can be spun
2. Wide range of count can be processed
3. It delivers a yarn with optimum characteristics
4. Idealized twisting system
5. It is uncomplicated and easy to operate
6. Higher yarn strength can be achieved

Disadvantages of Ring Spinning System:

1. Low production
2. Machine generates more heat

Limitations:

In ring spinning machine twisting and winding are done simultaneously. That's why the power consumption is higher.

Different parts of ring frame machine:

1. Thread guide
2. Spindle
3. Ring
4. Flange
5. Traveler
6. Apron

Thread guide: Roving in the ring frame passes from ring cops to yarn bobbin through thread guide. To keep the passage of yarn straight and to guide the yarn in a definite path.

Spindle: Spindle is an important part of ring frame. It helps in twisting and winding of yarns. It also holds the bobbin.

Ring: yarn passes through the ring with the help of traveler and wind up in the package. It acts as a guide of traveler.

Flange: Flange is the passage of traveler.

Traveler: It is the small part of ring frame. It helps to impart twist after drafting. It also helps to wind yarn on the bobbin and to keep uniform tension.

Apron: It is made of rubber which is placed on the drafting roller. Drafting quality depends on the size and shape of apron.



SELF-CHECK QUIZ 5.1.2

Check your understanding by answering the following questions:

1. Write down the name of main parts of ring frame.
2. What is the function of ring on a ring frame?
3. Write the name of operations of ring frame.



LEARNING ACTIVITY 5.1.3

Learning Activity	Resources/Special Instructions/References
Operate auto coner machine	<ul style="list-style-type: none">Information Sheets: 5.1.3, 5.1.4Self-Check Quizzes: 5.1.3, 5.1.4Answer Keys: 5.1.3, 5.1.4



INFORMATION SHEET 5.1.3

Learning Objective: to operate auto coner machine.

Auto coner machine:

Small packages as cop produced in ring frame machine are fed in cone winding machine or auto coner machine and cone is produced of two-kilogram weight. There are about 60 drums in auto coner.

Functions of auto coner machine:

1. To make a large package from many small packages.
2. To remove faults of yarn.
3. To cut the yarn when any problem occurred.

Parts of Auto coner machine:

1. Magazine
2. Yarn tensioner
3. Yarn clearer
4. Bobbin holder
5. Waxing device
6. Splicer
7. Travelling cleaner
8. Photo electric yarn feeler



Fig: Auto coner machine

There are five types of operator for auto coner machine:

1. Machine operator: creeling, piecing, checking different count and lot of yarns and doffing.
2. Bobbin sorter: selecting empty bobbins according to colour code, feeding the cops in the machine and separating the cops which are not suitable for feeding.
3. Doffer: checking the lots and counts of yarns during doffing, placing the packages in the storage place.
4. Floor cleaner: cleaning the floor always, keeping the waste materials in the definite place after completing of each shift.
5. Sticker writer: writing lot and counts of yarns in the package,



SELF-CHECK QUIZ 5.1.3

Check your understanding by answering the following questions:

1. What are the functions of autoconer?
2. Write down the name of different parts of autoconer machine.
3. How many types of operator work on auto coner machine?



INFORMATION SHEET 5.1.4

Learning Objective: to identify and operate rotor machine.

Rotor spinning machine is the alternative machine of ring spinning machine. No roving is needed in rotor machine. Drawn sliver is directly used in the machine. More production is possible than ring machine and production cost is less. This machine is used for producing coarser counts of yarns.



Fig: Rieter rotor spinning machine

The functions of a rotor machine operator:

1. To place the sliver cans in the correct place.
2. To place paper tubes and check lot and count of materials.
3. To perform doffing.
4. If the machine is stopped or signal lamp is on, then clean the rotor and run the machine.

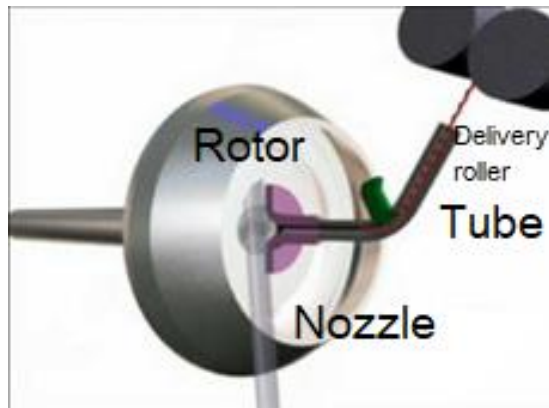


Fig: Rotor

5. To clean the machine.
6. To clean the suction box after interval.
7. To inform officer if any problem occurs in suction.

Main parts of Rotor machine:

1. Feed roller
2. Feed through
3. Opening roller
4. Naval
5. Feed tube
6. Rotor
7. Rotor groove
8. Withdrawal roller

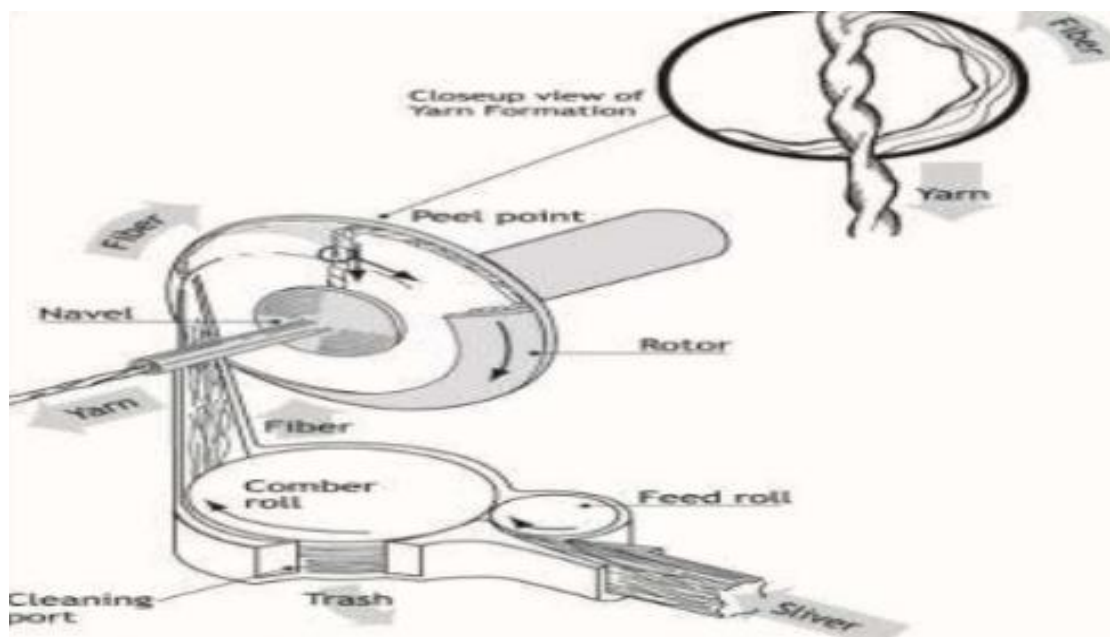


Fig: Main parts of rotor machine



SELF-CHECK QUIZ 5.1.4

Check your understanding by answering the following questions:

1. What are the functions of rotor machine operator?
2. Write down the different parts of a rotor machine.
3. How many types of functions are there in a rotor machine?



Learning Outcome 5.2 – Perform Feeding, Creeling and Piecing



Contents:

- Materials
 - Sliver
 - Roving
 - Yarn



Assessment criteria:

1. Materials are identified and arranged.
2. Materials are fed into the machines as per standard operating procedure.
3. Broken materials are pieced to continue production.



Resources required:

Students/trainees must be provided with the following resources:

- **Personal protective equipment (PPE):** safety cloths, hand gloves, dust mask, safety glasses. And ear plugs
- **Tools and equipment:** Simplex/speed frame, ring frame, rotor spinning, auto coner machine
- **Materials:** Sliver, roving and yarn



LEARNING ACTIVITY 5.2.1

Learning Activity	Resources/Special Instructions/References
Perform creeling, feeding and piecing	<ul style="list-style-type: none"> ▪ Information Sheet: 5.2.1 ▪ Self-Check Quiz: 5.2.1 ▪ Answer Key: 5.2.1



INFORMATION SHEET 5.2.1

Learning Objective: to perform creeling, feeding and piecing.

Creeling, feeding and piecing for Simplex machine:

Creeling is the placing of full packages of raw materials in the feed side or back side of the machine. Drawn sliver collected from draw frame machine are creeled in the simplex machine. Number of sliver and creel depend on number of spindle of the machine.

Feeding is the placement of materials from input packages to output packages through drafting zone.

Piecing is the joining of broken ends. When sliver or roving breaks, piecing is done to continue the production.

Creeling, feeding and piecing for Ring frame machine:

Creeling is the placing of full packages of raw materials in the feed side or back side of the machine. Roving collected from Simplex machine are creeled in the Ring frame machine. Number of roving and creel depend on number of spindle of the machine.

Feeding is the placement of materials from input packages to output packages through drafting zone.

Piecing is the joining of broken ends. When roving or yarn breaks, piecing is done to continue the production.

Creeling, feeding and piecing for auto coner machine:

Creeling is the placing of full packages of raw materials in the feed side or back side of the machine. Ring cops or bobbin cops collected from ring frame machine are creeled in the auto coner machine. Number of cops and creel depend on number of drums of the machine.

Feeding is the placement of materials from input packages to output packages through different parts of the machine.

Piecing is the joining of broken ends. When sliver or roving breaks, piecing is done to continue the production.



SELF-CHECK QUIZ 5.2.1

Check your understanding by answering the following questions:

1. How creeling is done in the ring frame machine?
2. What is piecing?
3. What is the input and output of ring frame?



Learning Outcome 5.3 – Perform Doffing Operation



Contents:

- Packages:
 - Sliver can
 - Roving bobbin
 - Ring cup
 - Cone



Assessment criteria:

1. Roving and yarns are collected.
2. Full and empty packages are arranged as required.



Resources required:

Students/trainees must be provided with the following resources:

- **Personal protective equipment (PPE):** safety cloth, hand gloves, dust mask, safety glasses
- **Tools and equipment:** Simplex/speed frame, ring frame, rotor spinning, auto coner machine
- **Materials:** Sliver, roving and yarn



LEARNING ACTIVITY 5.3.1

Learning Activity	Resources/Special Instructions/References
Perform doffing operation	<ul style="list-style-type: none"> ▪ Information Sheet: 5.3.1 ▪ Self-Check Quiz: 5.3.1 ▪ Answer Key: 5.3.1



INFORMATION SHEET 5.3.1

Learning Objective: to perform doffing operation.

Doffing for simplex, ring frame and auto coner machine:

Doffing is the placement of empty packages and remove full packages from delivery side of the machine. Roving bobbins are doffed in the simplex machine. Roving cops are doffed in the ring frame machine and cone packages are doffed in the auto coner machine.



SELF-CHECK QUIZ 5.3.1

Check your understanding by answering the following questions:

1. What is doffing?
2. Which package is doffed in ring frame machine?



Learning Outcome 5.4 – Clean the Machines and Packages



Contents:

- Machine parts:
 - Drafting zone
 - Spinning head
 - Drum head
 - Guide
 - Tensioner



Assessment criteria:

1. Machine parts are cleaned as per manufacturer instructions.
2. Packages are cleaned as per standard operating procedure.



Resources required:

Students/trainees must be provided with the following resources:

- **Personal protective equipment (PPE):** safety cloth, hand gloves, dust mask, safety glasses
- **Tools and equipment:** Simplex/speed frame, ring frame, rotor spinning, auto coner machine, sliver can, roving bobbin, ring cup and cone
- **Materials:** Sliver, roving and yarn



LEARNING ACTIVITY 5.4.1

Learning Activity	Resources/Special Instructions/References
Clean the machine and packages	<ul style="list-style-type: none"> ▪ Information Sheet: 5.4.1 ▪ Self-Check Quiz: 5.4.1 ▪ Answer Key: 5.4.1



INFORMATION SHEET 5.4.1

Learning Objective: to perform cleaning the machine and packages.

Cleaning is important for every machine and packages. Different machine has many rollers, drums, guides and tensioners which need cleaning operation. So, when a machine runs for some times, then it needs to be cleaned. Mainly drafting rollers in the drafting zone of the simplex and ring frame machine are brushed for cleaning. Some parts are cleaning by oiling or greasing. Winding drums of auto cones machine are also cleaned. Packages are also needed to be cleaned as some roving or yarns remain in the packages.



SELF-CHECK QUIZ 5.4.1

Check your understanding by answering the following questions:

1. Write the name of the parts which are needed to be cleaned.
2. Why cleaning is necessary?



Learning Outcome 5.5 – Dispose of Waste Material



Contents:

- Waste materials separation and disposal of



Assessment criteria:

- Waste materials from machine is identified.
- Waste material is separated and disposed of as per standard operating procedure.



Resources required:

Students/trainees must be provided with the following resources:

- Personal protective equipment (PPE):** safety cloth, hand gloves, dust mask, safety glasses
- Tools and equipment:** Simplex/speed frame, ring frame, rotor spinning, auto coner machine, sliver can, roving bobbin, ring cup and cone
- Materials:** Sliver, roving and yarn



LEARNING ACTIVITY 5.5.1

Learning Activity	Resources/Special Instructions/References
Dispose of waste materials	<ul style="list-style-type: none"> Information Sheet: 5.5.1 Self-Check Quiz: 5.5.1 Job Sheet 4 Answer Key: 5.5.1



INFORMATION SHEET 5.5.1

Learning Objective: to dispose of waste materials.

Disposing of waste materials are also very important for spinning industries. Different types wastages are collected in different stages of production.

Wastages in Simplex/Speed Frame:

- Sliver

2. Roller Waste/Bonda
3. Roving Waste
4. Sweeping Waste
5. Clearer waste
6. Invisible Waste

Wastages in Ring Frame:

1. Pneumaphil
2. Bonda
3. Roving waste
4. Thread waste
5. Fly dust
6. Sweeping waste



SELF-CHECK QUIZ 5.5.1

Check your understanding by answering the following questions:

1. Write the name of some wastages of simplex machine.
2. Write the name of some wastages of ring frame machine.



JOB SHEET 4			
Qualification:	Basic Techniques of Yarn Manufacturing		
Learning unit:	Operate simplex, ring frame and auto coner machine		
Learner name:			
Personal protective equipment (PPE):	Hand gloves, dust mask, ear plug, apron and goggles.		
Materials:	Sliver, roving and yarn.		
Tools and equipment:	Simplex, Ring frame and auto coner machine		
Performance criteria:	<ol style="list-style-type: none"> 1. Appropriate personal protective equipment is identified and selected. 2. Hand tools are identified and selected as per job requirement. 3. Control points are identified. 4. The machines (Simplex/speed frame, ring frame and auto coner) are operated as per standard operating procedure. 5. Block of materials are identified and separated. 6. Materials are identified and arranged. 7. Materials are fed into the machines as per standard operating operation. 8. Broken materials are pieced to continue production. 9. Full and empty packages are arranged as required. 10. Machine parts are cleaned as per standard manufacturer instruction. 11. Waste materials are separated and disposed of as per standard operating procedure. 		
Measurement:	Maintain the speed of the machine Maintain the quality of the product		
Notes:	Clean the drafting zone when required.		
Procedure:	<ol style="list-style-type: none"> 1. Collect the sliver from the finisher draw frame machine. 2. Feed the materials into the machine. 3. Operate the machine. 4. Separate waste materials and dispose of. 		
Learner signature:		Date:	
Assessor signature:		Date:	
Quality Assurer signature:		Date:	
Assessor remarks:			



ANSWER KEYS

ANSWER KEY 5.1.1

1. The main function of simplex machine is the attenuation of drawn sliver and insert small amount of twist to give required strength of roving. Finally, the twisted roving is wound on to bobbin.
2. Main parts of the simplex machine are:
 - a. Creel zone
 - b. Drafting zone
 - c. Delivery zone
 - d. Spindle driving mechanism
 - e. Bobbin driving mechanism
 - f. Head stock and tail stock

ANSWER KEY 5.1.2

1. Main parts of ring frame are
 - Thread guide
 - Spindle
 - Ring
 - Flange
 - Traveller
 - Apron
2. Functions of ring frame are:
 - To create yarn of certain count by drafting process by roving.
 - To make yarn stronger by twisting.
 - To wind yarn in definite ring cop.
3. Operations of ring frame are:
 - Creeling
 - Drafting
 - Twisting
 - Winding
 - Building and doffing

ANSWER KEY 5.1.3

1. Functions of auto coner machine are:
 - To make a large package from many small packages.
 - To remove yarn faults.
2. Magazine, yarn tensioner, yarn clearer, bobbin holder, waxing device, splicer, traveling cleaner.
3. Operators of auto coner machine are:
 - Machine operator
 - Bobbin sorter
 - Doffer
 - Floor cleaner

ANSWER KEY 5.1.4

1. Functions of rotor spinning machine are:
 - a. To place the sliver cans in the correct place.
 - b. To place paper tubes and check lot and count of materials.
 - c. To perform doffing.
 - d. If the machine is stopped or signal lamp is on, then clean the rotor and run the machine.
 - e. To clean the machine
 - f. To clean the suction box after interval
 - g. To inform officer if any problem occurs in suction
2. Rotor, nozzle, tube and delivery roller.
3. Functions of rotor spinning machine:
 - a. Producing coarser counts of yarns.

- b. Production cost less.
- c. Yarn strength is better.

ANSWER KEY 5.2.1

1. Creeling is the placing of full packages of raw materials in the feed side or back side of the machine. Roving collected from Simplex machine are creeled in the Ring frame machine. Number of roving and creel depend on number of spindle of the machine.
2. Piecing is the joining of broken ends. When sliver or roving breaks, piecing is done to continue the production.
3. Input of ring frame is called roving and output is called yarn.

ANSWER KEY 5.3.1

1. Doffing is the placement of empty packages and remove full packages from delivery side of the machine.
2. Ring bobbins are doffed in the ring frame machine.

ANSWER KEY 5.4.1

1. Different machine has many rollers, drums, guides and tensioners which need cleaning operation.
2. Cleaning is necessary to run the machine smoothly and for getting quality product.

ANSWER KEY 5.5.1

1. Wastages of Simplex/Speed Frame:
 - a. Sliver
 - b. Roller Waste/Bonda
 - c. Pneumaphil waste
 - d. Roving waste
 - e. Sweeping waste
 - f. Clearer waste
 - g. Invisible waste
2. Wastages of Ring Frame:
 - a. Pnemaphil: 0.20-0.30%
 - b. Bonda: 0.20-0.30%
 - c. Roving waste: 0.10-0.20%
 - d. Thread waste: 0.10-below
 - e. Fly dust: 0.20%
 - f. Sweeping waste: 0.20%

Module 6: Carry out quality control of materials



MODULE CONTENT

Module Descriptor: This module covers the knowledge, skills and attitudes required to carry out quality control of materials. It specifically includes identifying spinning accessories to be implemented, identifying fibre and yarn faults, and testing the quality of the materials.

Nominal Duration: 24 hours



LEARNING OUTCOMES:

Upon completion of the module, the student/trainee will be able to:

- 6.1 Identify spinning accessories
- 6.2 Identify fibre and yarn faults
- 6.3 Test the quality of the materials



PERFORMANCE CRITERIA:

1. Spinning accessories are identified and selected as per the product specifications.
2. Selected spinning accessories are implemented.
3. Fibre and yarn faults are identified.
4. Identified faults are reported to appropriate authority.
5. Material quality is identified and established.
6. Fibre and yarn properties are tested.
7. Test results are reported to appropriate authority.



Learning Outcome 6.1- Identify Spinning Accessories



Contents:

- Spinning accessories
 - Head
 - Guide
 - Tensioner
 - Package
 - Bobbin
 - Cone



Assessment criteria:

1. Spinning accessories are identified and selected as per the product specifications.
2. Selected spinning accessories are implemented.



Resources required:

Students/trainees must be provided with the following resources:

- **Personal protective equipment (PPE):** safety cloth, hand gloves, dust mask, safety glasses, ear plugs
- **Tools and equipment:** Ring frame, auto coner
- **Materials:** Yarns



LEARNING ACTIVITY 6.1.1

Learning Activity	Resources/Special Instructions/References
Identify spinning accessories	<ul style="list-style-type: none"> ▪ Information Sheet: 6.1.1 ▪ Self-Check Quiz: 6.1.1 ▪ Answer Key: 6.1.1







INFORMATION SHEET 6.1.1

Learning Objective: to identify spinning accessories.

- Head
- Guide

- Tensioner
- Package
- Bobbin
- Cone

<u>Accessories</u>	<u>Figure</u>
<p>Guide: Guide is used to keep the yarn in the definite path and take it from one part to another part of the machine.</p>	
<p>Tensioner: Tensioner is used to apply constant tension on the yarn and to make a uniform package.</p>	
<p>Package: Cone or cheese is the yarn package which holds the long length of yarn.</p>	
<p>Bobbin: Bobbin is also one kind of yarn package from which cone or cheese package is used.</p>	



SELF-CHECK QUIZ 6.1.1

Check your understanding by answering the following questions:

1. Why guide is used?
2. What is the function of tensioner?
3. Write the name of some yarn package.



Learning Outcome 6.2 – Identify Fibre and Yarn Faults



Contents:

- Fibre faults
- Yarn faults



Assessment criteria:

1. Fibre and yarn faults are identified.
2. Identified faults are reported to appropriate authority.



Resources required:

Students/trainees must be provided with the following resources:

- **Personal protective equipment (PPE):** safety cloth, hand gloves, dust mask, safety glasses
- **Tools and equipment:** AFIS, USTER tester
- **Materials:** Fibres and yarns



LEARNING ACTIVITY 6.2.1

Learning Activity	Resources/Special Instructions/References
Identify fibre and yarn faults	<ul style="list-style-type: none"> ▪ Information Sheets: 6.2.1 ▪ Self-Check Quiz: 6.2.1 ▪ Answer Key: 6.2.1



INFORMATION SHEET 6.2.1

Learning Objective: to identify fibre and yarn faults.

- Fibre faults:
 - Foreign matters
 - Dead fibres
 - Immature fibres
- Yarn faults:
 - Thick and thin places

- Neps
- Slubs
- Soft yarn
- Loose winding
- Knots

Fibre faults:

Faults	Causes
Foreign matters	When other fibres mixed with the fibres.
Dead fibres	About 10-15% cotton fibre become dead when it is collected before the right time.
Immature fibres	If the tree cotton plant is affected by the insects then this type of problem will be shown.

Yarn faults:

Thick place: Thick places are often caused by soiling or damaged machine parts or less drafts in the drafting zone.



Thin place: Thin places can occur, for example, through excessive drafts in the drafting assembly.



Neps: Yarn containing rolled fibre mass, which can be clearly seen at close distance, measurable on Uster imperfection indicator.



Slubs: An abnormally thick place or lump in yarn showing less twist at that place.



Soft yarn: Yarn which is weak indicating lesser twist.



Loose winding: If the yarn tension is improper during winding.

Knots: Knots caused by bad piecing in the yarn for over end piecing.



Oily yarn: Yarn stained with oil.



Hairiness: Protrusion of fibre ends from the main yarn structure.



Snarl: Yarn with kinks (twisted onto itself) due to insufficient tension after twisting.



SELF-CHECK QUIZ 6.2.1

Check your understanding by answering the following questions:

1. Why dead fibres are found in cotton?
2. What is neps?
3. What is hairiness?



Learning Outcome 6.3 – Test the Quality of the Materials



Contents:

- Material quality identification
- Fibre and yarn properties



Assessment criteria:

1. Material quality is identified.
2. Fibre and yarn properties are tested.



Resources required:

Students/trainees must be provided with the following resources:

- **Personal protective equipment (PPE):** safety cloth, hand gloves, dust mask, safety glasses
- **Tools and equipment:** AFIS and USTER tester
- **Materials:** Fibres and yarns



LEARNING ACTIVITY 6.3.1

Learning Activity	Resources/Special Instructions/References
Test the quality of the materials	<ul style="list-style-type: none"> ▪ Information Sheet: 6.3.1 ▪ Self-Check Quiz: 6.3.1 ▪ Job Sheet 5 ▪ Answer Key: 6.3.1



INFORMATION SHEET 6.3.1

Learning Objective: to test the quality of the materials.

Quality control lab is essential for every spinning industry. In the quality control lab, the quality of the raw materials of spinning industries and the output products are tested. The raw materials of the spinning section are cotton, different types of fibres and output materials are yarns. AFIS or USTER testing machine is used to test the quality of cotton, fibres and yarns.

Uster High Volume Instrument (HVI) is most widely used to measure the quality of the fibres. Cotton fibres are collected in bale form. Fibres are collected from each bale and tested some parameters of the fibres.

The bales are then stored or used or laid down in the blow room line according to the quality of the fibres to maintain the uniformity of fibres and quality of yarns. This process is known as bale management.

Uster HVI Machine:

There are three modules in the Uster HVI Machine. They are :

1. Length and strength module
2. Micronaire module
3. Colour and trash module

Different properties of fibres are measured by this HVI machine.

Module	Properties	Description
Length and strength	Mean length	Average length of fibres
	Strength	Fibre strength is measured in gm/tex. Cotton fibre strength is normally 24-28gm/tex.
	Elongation	
	SFC	Short fibre content means percentage of short fibres in the cotton fibres.
Micronaire	Micronaire	Fibre fineness
	Maturity	Fibre maturity
Colour and trash	RD	Reflectance or Brightness
	Plus B	Yellowness
	Trash grade	Amount of trash



Fig : Uster HVI Machine



Uster AFIS machine:



Fibres are processed by beating in the blow room machine. As a result some long fibres are broken and entangled together, forms neps in the fibres. These neps are eliminated in the carding machine. Fibres are also individually oriented in the carding machine. So, many properties of fibres are changed after carding. To measure these fibre properties, Uster AFIS Machine is used.

<u>Module</u>	<u>Properties</u>	<u>Description</u>
Neps	Neps (Counts per gram)	The number of Neps per gram fibre is measured.
	S C N(Counts per gram)	The number of seed coat neps per gram fibre is measured.
Length and Fineness	Mean fibre length	Fibres average length
	Fibre fineness	Fineness of fibre is measured in militex unit



Fig: Uster AFIS Machine

Name of the testing machine	Figure	Function
Uster tester		Fibre length, strength, neps, colour and trash etc.
Wrap reel		For measuring yarn and making it into hanks of a standard size

Wrap block		For measuring desired length of yarn and roving and making it into hanks of a standard size
Weight meter		For measuring weight of fibre or yarn.
Lee strength tester		To determine the strength and elongation of yarn.



SELF-CHECK QUIZ 6.3.1

Check your understanding by answering the following questions:

1. What is experimented by uster office machine?
2. What do you understand by neps per count?
3. What do you understand by length and fineness?



JOB SHEET 5			
Qualification:	Basic Techniques of Yarn Manufacturing		
Learning unit:	Control yarn properties		
Learner name:			
Personal protective equipment (PPE):	Hand gloves, apron		
Materials:	Fibre and yarn		
Tools and equipment:	Inspection machine, needle, scissor and nipper		
Performance criteria:	<ol style="list-style-type: none"> 1. To get direction from supervisor. 2. To identify and select correct protection equipment. 3. To identify and select yarn manufacturing accessories according to needs. 4. To correctly use selected yarn accessories. 5. To identify yarn faults and list them. 6. To note test report and show report to supervisor. 		
Measurement:	<ul style="list-style-type: none"> ▪ Measure the amount of yarn faults ▪ Count the number of yarn faults ▪ Measure the yarn quality level 		
Notes:	<ul style="list-style-type: none"> ▪ Measure the faults in right procedure 		
Procedure:	<ol style="list-style-type: none"> 1. Follow the work direction given by supervisor. 2. Collect personal protective equipment, required materials, machines and equipment. 3. Check the usability of personal protective equipment, required materials, machines and equipment. 4. Set the fibres correctly in the machine for inspection. 5. List the correct number of yarn faults. 6. List the standard operating process according to yarn faults. 7. Maintain the testing machine correctly during testing. 		
Learner signature:		Date:	
Assessor signature:		Date:	
Quality Assurer signature:		Date:	
Assessor remarks:	<ul style="list-style-type: none"> ✓ The products quality depends on raw materials quality ✓ The yarns required materials are identified ✓ Identify the required instruments for quality control of materials 		



ANSWER KEYS

ANSWER KEY 6.1.1

1. Guide is used to keep the yarn in the definite path and take it from one part to another part of the machine.
2. Tensioner is used to apply constant tension on the yarn and to make a uniform package.
3. Bobbin, cone and cheese

ANSWER KEY 6.2.1

1. About 10-15% cotton fibre become dead when it is collected before the right time.
2. Yarn containing rolled fibre mass, which can be clearly seen at close distance, measurable on Uster imperfection indicator.
3. Protrusion of fibre ends from the main yarn structure.

ANSWER KEY 6.3.1

1. Mean length, strength, micronaire, maturity, RD and Plus B.
2. The number of neps per gram fibre is measured.
3. Average length of fibres and fineness of fibre is measured in militex unit.